Addendum Report

Taro East Landfill
Expert Panel

December 2000

104-05277/

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Section 1.0

Introduction

The Taro East Landfill Expert Panel released its Final Report to both the Community Liaison Committee and the general public on October the 25th, 2000. The Final Report was tabled at a public meeting during which the Expert Panel outlined its findings in a presentation and answered questions from the floor. During the presentation, the Panel provided contact information so that members of the public could give feedback to the Panel by fax, email, or voicemail. As mandated in the Expert Panel's Terms of Reference, any response or comment forwarded to the Panel would be included in the Addendum Report to the Minister (unless the individual giving the feedback asked to have it remain confidential.)

The Expert Panel received the following written submissions:

1. Philip Services Corp, 2 pgs, November 10, 2000
2. Mr. Paul Kurelek, 6 pgs, November 15, 2000 (subsequently attached as part of the CLC submission)
3. Dr. George Sorger, 2 pgs, November 15, 2000
4. Mr. Charles Eleveld, 3 pgs, [no date] received December 6, 2000
5. Community Liaison Committee, 7 pgs, December 6, 2000

These submissions appear in the Appendix to this Addendum Report. The Panel received no voicemails or emails, and only one fax alerting us to the pending submission from Charles Eleveld.

On the whole, the Panel has been encouraged by the response to its Final Report. The Panel urges all parties to work together toward the implementation of its recommendations. It is hoped that this Addendum Report (containing our responses to submissions received by the Panel) will facilitate this process.

The purpose of this report is to address the written comments forwarded to the Expert Panel as well as to correct both factual and typographical errors within the Final Report.

In accordance with a request from CLC members at their December 6, 2000 meeting, the Expert Panel will make no comments on the substance of the submission forwarded by the CLC. (We do however offer some points of clarification regarding comments made in their document.). It should be noted that the CLC's request for no written response was made in the best spirit of speeding up the process of having the Minister of the Environment respond to the Final Report and this Addendum Report.

In the same spirit, the Expert Panel has decided not to comment further in this Addendum Report on oral questions raised by those in attendance at the October 25, November 15 or December 6th 2000 CLC meetings beyond the oral answers Panel members provided at

those meetings. Should interested parties wish to review those answers, the CLC minutes are the best source.

The final section of the Addendum Report comprises the Health Report, which elaborates on the discussion of health issues in the Final Report.

Section 2.0

Response to the Submission by Dr. George Sorger

(Letter to the Expert Panel dated November 10th, 2000)

Dr. Sorger has raised several concerns about the performance of the Woodward Avenue WWTP. In his letter, Dr. Sorger focuses on the performance of the WWTP in terms of effluent quality (as measured according to the plant's Certificate of Approval) rather than on the direct impact of Taro leachate on the plant. Dr. Sorger states that the Woodward WWTP is not capable of handling the contaminants it is designed to remove from Hamilton's wastewater. In support of this statement, several performance parameters are discussed with tables and graphs appended to his letter.

The Expert Panel's responses to Dr. Sorger's concerns follow his original numbering:

1) (i) At the present time, the Woodward WWTP Certificate of Approval (CofA) does not include a requirement to remove ammonium. The Hamilton Harbour Remedial Action Plan has called for both the Woodward Avenue WWTP and the Burlington Skyway WWTP to provide for ammonium removal. Currently the Skyway WWTP is under expansion, and system optimization has enabled it to provide for significant ammonium removal. The Skyway WWTP had also previously had its aeration system upgraded to assist with this process. There is no definitive progress towards mandating nitrification (i.e. removal of ammonium) for the Woodward plant. Dundas and Waterdown WWTP's are both required to remove ammonium as per their Cs of A. This is the reason the performance of these two plants is markedly different from Woodward. Dundas discharges to Cootes Paradise and Waterdown discharges to Grindstone Creek, both sensitive receivers upstream of Hamilton Harbour. Notwithstanding, the Woodward WWTP is the largest single contributor of ammonium to the harbour.

(ii) The reason that the solids are higher at Woodward is because both Dundas and Waterdown are required to provide tertiary effluent filtration to meet their more stringent Cs of A. They use granular media (sand) filters to filter more solids from the effluent of the biological systems at these two plants. Otherwise the plant processes are similar at all of these three plants.

(iii) The BOD is lower at Dundas and Waterdown for the same reason as (ii) above.

(iv) The total phosphorus concentration at Dundas and Waterdown is again lower primarily due to the effluent filters at these two plants. Otherwise, Woodward does use the same precipitation process for phosphorus removal, but cannot achieve the same overall removal without effluent filtration.

The Woodward plant will be more capable of achieving lower effluent concentrations with the current improvements underway at the facility (i.e. new primary clarifiers, separate biological solids thickening [waste activated sludge], improvements to the north plant secondary clarifiers, and future fine pore aeration). The Hamilton Harbour RAP has called for tighter limits on the effluents for both Woodward and Skyway; however, until the RAP criteria are adopted at Woodward and further upgrades, e.g. effluent filtration, are completed, it will be difficult to achieve significant improvements in effluent quality. The Panel would be pleased by the prompt adoption of the RAP criteria for the Woodward Ave. WWTP.

2) The BOD in the treated effluent from Woodward is within the current CofA criteria of 25 mg/L (Figure 2). Similarly, the effluent total phosphorus (TP) is within the CofA criteria of 0.8 mg/L, except for the last month of the data provided in the graph (Figure 4) appended to Dr. Sorger's letter. This increase in the TP in the last month appears to be associated with a parallel increase in the suspended solids (Figure 3). There does appear to be an increasing trend in the data shown in the graphs, and this is cause for further investigation.

3) The issue of effluent ammonium was discussed above; however, it is important to point out that the values for this parameter are typical for plants not removing ammonium nitrogen. It is not fair to say that the values of ammonium are very high. Regarding the coliform values, it is to be expected that the levels would be high in the winter months when effluent disinfection is not practiced as per the CofA. The observation of 'dead rats' cannot be correlated to the presence or absence of chlorination and chlorination by-products in the effluent. Chlorination has historically been practiced for the protection of human health. It is noteworthy, however, that chlorination of the secondary effluent at the Burlington Skyway WWTP will be eliminated in the future with the addition of an ultraviolet (UV) light disinfection process. This will eliminate the formation of chlorination by-products there.

As discussed in the response to the statements by Mr. Brad Clark during the October 25th CLC Meeting, the (US)EPA does approve of the use of publicly owned treatment works (POTWs, also known as sewage treatment plants) for the handling and treatment of non-hazardous waste landfill leachates. Other WWTPs in Ontario are also used to treat non-hazardous waste landfill leachates.

There is no evidence to suggest that Taro East leachate would not be treatable at Woodward; however the Panel has recommended treatability pilot test to verify this. The Woodward WWTP is not oxidizing ammonium, and it is not required to do so at the present time. It is highly likely that it will be required to nitrify in the future when the RAP goals are promulgated for Woodward.

Dr. Sorger implies that additional large volumes of leachate would be handled, but that is not the case for Taro East. In addition the Woodward WWTP receives only about three quarters of its design sewage flow on average.

Taro East would be a small percentage of the flow as stated in the Panel Report. We estimate the ultimate Taro East leachate flow percentage to be about 0.1 percent of the Woodward Avenue WWTP's design flow capacity.

4) Dr. Sorger raises the concern that a superficial reading of the Panel's Final Report may lead some readers to conclude that leachate from the East Landfill should be directed to the Woodward Ave. WWTP, even if the Panel's recommendations regarding leachate treatment are not implemented right away.

The Panel encourages all stakeholders to read the Panel's Final Report in its entirety to become familiar with all the conclusions and recommendations presented. To minimize potential misunderstandings, the Panel wishes to clarify its recommendations regarding leachate treatment as follows:

The Panel recommends that any discharge of East Landfill leachate should be subject to the following PRECONDITIONS:

a) That the WWTP and the Company develop and implement a notification system under which the company will hold back the leachate at the landfill during by-pass or upset events. (Reference Condition 3 on Page 40 of the Final Report).

b) That the current Region Sewer Use By-Law limits and policies for chloride and sulphate be amended, such that East Landfill leachate could be discharged to the sewer system in compliance with the By-Law. (Reference Condition 5 on Page 40 of the Final Report).

c) That the impact of the Taro West and East Landfill leachate on the Woodward Avenue WWTP should be evaluated through experimental wastewater treatment pilot plant tests together with scans for metals and trace organics removals and accumulation in biosolids. Discharging of Taro East leachate to the Woodward WWTP should only occur if these tests show that it is acceptable. (Reference Condition 6a on Page 41 of the Final Report).

d) That in lieu of a chloride pre-treatment plant (and given savings realized by not building the plant and by eliminating the trucking and handling of leachate off-site), the Company should provide funding (to be negotiated with the Region) for using the sewer system. (Reference Condition 6b on Page 41 of the Final Report).

In summary, none of the data and information presented by Dr. Sorger indicate that Taro leachate is now or will become in the future the cause of operating performance limitations at the Woodward WWTP. The Panel concurs that the Region should expedite the upgrades at the WWTP to overcome any operating limitations that it has. The Panel's recommendations, clarified above, will ensure that any treatment of East leachate at the Woodward Ave. WWTP will be subject to appropriate safeguards.

Section 3.0

Response to the Submission by Mr. Charles Eleveld

The following is the Panel's response to Mr. Eleveld's comments contained within and numbered according to his submission:

1) Mr. Eleveld correctly points out that the Hon. Brad Clark was elected in a regular provincial election, not a by-election as stated in the 3rd paragraph on page 4 of the Panel Report. The Panel has noted this correction in the list of Errata (below).

2) Mr. Eleveld disagrees with the inclusion of Footnote 17 in the Panel Report. The Panel notes his disagreement.

3) Mr. Eleveld suggests inconsistency with respect to the Panel's interpretation of our Terms of Reference. To clarify, the Panel was not empowered to gather new scientific data itself. It was however authorized to recommend additional scientific data gathering by other bodies, and has done so through numerous recommendations in its Final Report.

4) Mr. Eleveld suggests that footnote #25 on page 13 of the Panel's Report makes no sense. In footnote 25, the Panel simply conveyed information provided by officials in the state of Michigan.

5) Mr. Eleveld correctly points out a typographical error in footnote 38 on page 20 of the Panel's report. The footnote should read as follows: "Officials from the MOE advised the Panel that the Ministry agrees that sampling is not the appropriate means to monitor what is in the landfill."

6) Mr. Eleveld suggests that West Landfill leachate is flowing mostly untreated into Lake Ontario, and notes that the lake is the source of Hamilton's drinking water.

The Panel has provided several recommendations in its report regarding improvements in leachate handling and treatment, but does not agree that the leachate is going "mostly untreated." Although inorganic parameters such as chloride are not removed by the wastewater treatment plant, other contaminants, including organics and metals are separated in the plant.

7) Mr. Eleveld suggests that the Compliance Agreement was not given consideration, as it is not on the reference list. Not including it in the reference list was an oversight, as the Panel was aware of the Agreement and referred to it on pages 29, 31 and 36 of the Panel's report.

8) Mr. Eleveld's comment # 8 suggests that some of the Panel's recommendations are based on inaccurate statements, without double-checking and ensuring that the source of information was reliable and accountable. This comment appears to be a lead-in to the rest of Mr. Eleveld's submission, which focuses on leachate treatment issues. The Panel deals

with the (unnumbered) leachate treatment issues raised in the rest of the Eleveld submission below.

3.1 LEACHATE TREATMENT ISSUES RAISED BY MR. ELEVELD

1) Mr. Eleveld provides 5 quotes from the Panel's Report, to highlight the issue that chloride is present in leachate at higher than anticipated levels, that it is the critical contaminant with respect to the MOE's Reasonable Use Policy (for groundwater quality on adjacent properties) at this landfill, and that leachate chloride levels do not meet the local Sewer Use By-Law.

The Panel devotes 3 full pages (pages 35 through 38) of its report to a discussion of the chloride treatment issue. The Panel also discussed the chloride issue in the Groundwater Impact Assessment section of its report (on pages 40 and 41), and agrees that chloride is likely the critical contaminant from a groundwater perspective.

2) Mr. Eleveld's next issue is that (as he puts it) the Panel is proposing to "open the gate" by allowing leachate from the Taro East Landfill to be diverted to the Woodward Ave. WWTP, a facility which Mr. Eleveld suggests is not able to treat leachate.

The Panel disagrees with the view that the Woodward Ave. WWTP is not able to treat leachate; however, the Panel has recommended allowing leachate from the East Landfill to be sent to the Woodward Ave. WWTP only if certain preconditions are met. In order to minimize misunderstandings of its position, the Panel wishes to clarify its recommendations regarding leachate treatment as follows (see also the Panel's response to the submission by Dr. Sorger):

The Panel recommends that any discharge of East Landfill leachate should be subject to the following PRECONDITIONS:

a) That the WWTP and the Company develop and implement a notification system under which the company will hold back the leachate at the landfill during by-pass or upset events. (Reference Condition 3 on Page 40 of the Final Report).

b) That the current Region Sewer Use By-Law limits and policies for chloride and sulphate be amended, such that East Landfill leachate could be discharged to the sewer system in compliance with the By-Law. (Reference Condition 5 on Page 40 of the Final Report).

c) That the impact of the Taro West and East Landfill leachate on the Woodward Avenue WWTP should be evaluated through experimental wastewater treatment pilot plant tests together with scans for metals and trace organics removals and accumulation in biosolids. Discharging of East leachate to the Woodward WWTP should only occur if these tests show that it is acceptable. (Reference Condition 6a on Page 41 of the Final Report).

d) That in lieu of a chloride pre-treatment plant (and given savings realized by not building the plant and by eliminating the trucking and handling of leachate off-

site), the Company should provide funding (to be negotiated with the Region) for using the sewer system. (Reference Condition 6b on Page 41 of the Final Report).

3) Mr. Eleveld provides several arguments to support his preferred leachate treatment option (a reverse osmosis leachate pre-treatment plant, to be constructed at the Taro Landfill).

The Panel had carefully reviewed this reverse osmosis (RO) option, and concluded that it did not provide an optimal solution for leachate treatment. The only obvious reason to pre-treat the East Landfill leachate (prior to sending it to the Woodward Ave. WWTP) is for removal of chloride. As the Panel notes in its discussion of this issue (on pages 35 through 38 of its Report), the costs of removing chloride from the leachate appear high compared to the benefit that would be achieved. The Panel's concerns included the following:

- the concentrate from an RO pre-treatment facility (about 20% of the flow to the facility) would require further treatment, either through costly off-site disposal or through an energy-intensive evaporation unit;
- the evaporation unit would produce a significant vapour plume, which would be clearly visible from the surrounding residential neighbourhoods on an ongoing basis;
- it would also produce a concentrated salt and metal residue which would likely require treatment as hazardous waste (the Panel does not share Mr. Eleveld's optimism that this residue could be "recycled");
- the capital and ongoing costs of the RO pretreatment system would be high.

The Panel understands that the Company had discussions with the Region regarding the construction of a leachate pre-treatment facility at the landfill for treating Taro West leachate. For whatever reason, the Region has not pursued this issue with the Company to date. The new City of Hamilton always has the opportunity to re-consider this issue with the Company if it wishes in the future.

The Panel notes that pre-treatment of leachate (through RO) is technically an option; however, based on the available information, the Panel came to the conclusion that it was probably not the best option. This does not however prevent the new City of Hamilton from revisiting this issue, or from reaching a different conclusion.

In the view of the Panel, there is certainly a need for the new City of Hamilton to develop and consistently apply a policy regarding discharges of high-chloride wastewaters and leachates from a variety of sources to the Woodward Ave. WWTP.

4) Mr. Eleveld indicates that in his view, Taro West (landfill) leachate is not acceptable and the discharge to the (Woodward Ave.) WWTP must be stopped. This view appears to be based on the chloride content of the leachate. Mr. Eleveld goes on to suggest that the Panel "missed the point" that chloride has a toxic effect and may be reclassified as toxic under Section 64 of the CEPA, 1999.

In fact, the Panel made specific reference to the possible reclassification of chloride in the last paragraph on page 37 of the Panel Report. It should be noted that the issue of chloride being reclassified as a toxic was focused around the issue of very high concentrations of road salt that impact the environment.

It is the new City of Hamilton which will determine the limits of what is acceptable for wastewater discharges to the sewer system. As mentioned above, the Panel's view is that the new City of Hamilton needs to develop a policy regarding discharges of high-chloride wastewaters (including landfill leachates) and apply it consistently to the Woodward Ave. WWTP and all other facilities.

5) Mr. Eleveld raises concerns about the ability of the Company and the new City of Hamilton to implement its recommendation for a notification system under which the Company will hold back leachate at the landfill during by-pass or upset events.

The Panel notes Mr. Eleveld's concern, but had been advised that the Company would either have or be able to develop the storage capacity to hold back leachate as recommended by the Panel.

It will be up to the Company and Region to implement this recommendation, and the Panel wishes to again emphasize (as noted above) that the discharge of East Landfill leachate to the City sewer system should be subject to implementation of this recommendation as one of several preconditions for allowing such a discharge to take place.

Section 4.0

Response to the Submission by Taro/Philip ("The Company")

The Expert Panel accepts and agrees with all errata and corrections provided by the Company. The Panel would also like to provide the following response to two observations made in the Company's submission:

1) The Panel recommended that arsenic be added (in the CofA) to the list of parameters monitored (ref. page 28, paragraph 2 of the Panel Report.) The Company has clarified that it is already testing for arsenic and in 2000 started testing for fluoride (which had been missed until then although it was specified in the CofA.) The Panel would still recommend that the CofA be amended appropriately to include arsenic.

2) The Company objected to the Panel's use of the term "overstrength" with respect to the West Landfill leachate (ref. page 31, paragraph 1 of the Panel Report). The Panel notes that its review of the monitoring records indicated that several parameters in the West Landfill leachate often do not meet the Sewer Use By-Law limits, including TKN, sulphate, chloride, phenols, and pH.

Section 5.0

Points of Clarification Regarding the CLC Submission

The Expert Panel wishes to clarify (for the sake of factual accuracy) some points raised in the CLC submission.

1) **Who originated the request to examine leachate treatment and the issue of the sports park?**

   - The leachate treatment request was contained in a letter from Terry Cooke to Minister Tony Clement (MOE) dated January 4, 2000 requesting that the Panel look at leachate treatment/disposal.[1] The Minister responded February 24, 2000 agreeing that the Panel should include an examination of such activity.[2]

   - The Sports Park request came from several of the people we met with. The Panel reported these requests to the Minister who in turn agreed that the Panel should examine land use issues, in particular the Sports Park, within the proscribed limits of the Terms of Reference.

2) **Was the Expert Panel intimidated by the Company lawyers and subjected to "political pressure" to expand its mandate?**

   - The Panel would like to stress that at no time was any member of the Panel intimidated in any manner by the presence of the Company's legal counsel at meetings, nor did the Panel feel intimidated by anyone else over the course of its work. The Panel appreciates that despite the acrimonious history of the situation, all parties provided valuable input, including the Company's legal counsel and employees with whom we met.

   - At no time did the Panel members feel "politically pressured" to take on new issues. The Panel had resolved early on to consider carefully the concerns of any person who communicated with the Panel. For example, the Panel responded at length (in an Appendix to the Final Report) to a set of written questions submitted by Carmen D'Angelo.

3) **Did the Expert Panel meet with all the relevant stakeholders in particular: Investigator Gordon Robertson, Michael Hilson and the Niagara Escarpment Commission?**

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[1] Letter to the Minister of the Environment, Tony Clement, from Terry Cooke, City of Hamilton, January 4, 2000.

[2] Letter from the Minister of the Environment, Tony Clement, to Terry Cooke, City of Hamilton, February 24, 2000.

- The Chair of the Expert Panel, Dr. David Bell, did contact and speak at length with Investigator Gordon Robertson on two separate occasions.
- Repeated efforts to meet with Mr. Hilson were not successful. Contact was made with Mr. Hilson's lawyer who indicated that Mr. Hilson had declined to meet with the panel.
- The NEC also declined to meet with the Expert Panel although they did forward pertinent documentation.
- Kathy McLean (citizen representative on the CLC) was invited to meet with the Panel in May when we met other citizen members of CLC.
- The Panel tried to arrange another meeting with all CLC members in early June and again in July. Unfortunately, scheduling conflicts and some miscommunication stood in the way of this occurring.

4) **Did the Expert Panel receive and review documentation from Mr. Roger Dixon?**

The Final Report listed only those references cited rather than all references that were consulted. The Panel did indeed receive documentation from Mr. Dixon concerning sampling of a landfill in New York State owned by Bethlehem Steel. Dr. Bell subsequently exchanged several emails with Mr. Dixon discussing the relevance of this documentation to the Taro East Landfill. A more formal discussion of these issues took place at the September CLC meeting where Mr. Dixon was in attendance.

Section 6.0

List of Errata

As with any major document, errors do occur. After a careful examination of the text a number of errors have been discovered. The following is a list of errata found within the Final Report.

Page 3 paragraph 2: Philip Environmental *Inc.* took ownership of the operation in *1990.*

Paragraph 4: second sentence should read "Taro Aggregates Ltd. commenced..." Philip Environmental Inc. did not own the property until 1990.

Page 4 paragraph 3: Brad Clark won an election not a by-election

Page 5 paragraph 3: a superscript 10 appears but there is no footnote 10 on that page

Page 6 (line 3) two superscripts (10 and 11) appear together

- the proper text for this footnote appears at the bottom of the page in footnote 10 (but it should be footnote #11)
- what appears at the bottom of the page as footnote 11 is the proper text for missing footnote 10 on p. 5

Page 7 paragraph 5: Philip Environmental Services should read Philip Services Corp.

Page 20 footnote 38: delete "not" at end of third line of this footnote

Page 37 paragraph 3: second sentence, "Noting the qualification (b)elow" should read "...below"

Page 37 paragraph 5: the recommendations of the Panel appear in bold in other areas of the report – therefore this recommendation should be bolded as well

Page 38 "The Panel recommends..." should also be in bold

Page 39 Under the heading 8.3.3.3.3: The panel was provided with the Companies' position on this issue at the briefing held on October 25th, 2000

Page 43 paragraph under heading 8.3.7.1: the sentence, "All surface water is collected together with the leachate, and taken to Brantford for treatment" is incorrect. The surface water is collected in the east quarry floor along with the dewatering sump water, is pumped to the west landfill sewer and is discharged to the sanitary system with the west landfill leachate.

Page 52 last paragraph: "In fact roadwork...." This sentence should have indicated that it was test drilling for the development of the closure plan which led to the discovery of small amounts of methane gas at the southern boundary of the

West Landfill in 1993. Immediate steps were taken to mitigate the situation without explosion or evacuation as has been erroneously reported in the media.

p. 56 footnote 71: phrase and word are missing. Footnote should read "In addition to health effects from exposure to contaminants, there is a potential for stress and other psycho-social health impacts, particularly among nearby residents of other affected members of the community who are exposed ..." [underlined portions missing]

Page 58 footnote, 81, page 59, footnote 83, page 79 – letter reference: Brad's last name should be spelled Farnand

Page 61 the document referenced in footnote 92 can be found at http://www.atsdr.cdc.gov/HEC/PRHS/

Page 69 footnote 99: under b) it should read "grab" not "brag" samples

Page 75 Conclusion 16: There is a stray capital M at the end of the paragraph

Page 78 CBC: the reference date is 1999.

Page 103 footnote 10: the date of the memo should read September 21, 1999.

Appendix I

The Health Report[3]

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[3] This health report was prepared, for the approval of the Expert Panel, by Fran Scott MD and Tom Podor PhD, the two health representatives on the Panel. Both authors live and work in Hamilton-Wentworth. The recommendations contained within this report are included along with summaries of the supporting rationale, in the Final Report of the Panel.

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Section 1.0

Summary

This report begins with a review of the past and current health assessment around the Taro East Landfill, with information on the other Taro activities (West Landfill and Quarry) where available and relevant. To place the Taro site into context with other landfills, this report includes an overview of the field of environmental health, and evidence from the scientific literature.

The Taro East Landfill Expert Panel (hereafter called the Panel) recognizes the continued concerns of the community about past, current and future health issues and makes a number of recommendations in its final report to provide for better health understanding and greater health protection. The Panel recommends a process for raising and resolving ongoing health concerns through an adequately supported sub-committee of the Community Liaison Committee (CLC). This subcommittee would provide the CLC with health expertise to interpret and communicate monitoring results, review and recommend health protection measures and investigate health concerns.

The Panel also makes specific recommendations to improve the waste and contaminant monitoring protocol and strategies. The Panel recognizes that, although the evidence from the environmental monitoring and risk assessment to date indicates very low exposures and low risk to health, the public still has concerns regarding potential health impacts. The Panel is recommending a health study program to be directed by the proposed health sub-committee of the CLC, to be supported, in part, by the Company. It is proposed that this study program could include analyses of health data over the past years and additional study of children's respiratory health.

Section 2.0

Background to Health Assessment at Taro East Landfill[4]

As a component of the Environmental Assessment (EA), the Company was required to "undertake a long term study of sources of potential health impacts and develop a health impact prevention programme."[5] To meet this requirement the Company contracted with CanTox Environmental Inc. to complete a risk assessment. This assessment was developed in consultation with the EA Study Group and was reviewed by a number of experts.

The Regional Health Unit expressed concerns about the assessment because it did not contain measures of psycho-social impacts nor did it include monitoring for small air particles.

The Panel was told that the Health Unit's concerns were discussed with the EA Study Group and their lawyer, Harry Dahme. Mr. Dahme subsequently wrote a letter to the Minister of Environment and Energy requesting the addition of a Schedule "I" (Appendix 2). This Schedule was intended to ensure ongoing health risk assessment based on up-to-date monitoring results and to provide an explicit consultation process for review and response. The Company has considered Schedule "I" to be an ongoing requirement of the EA and has continued to contract with CanTox to produce an annual "Community Health Assessment Review" and report in the Company's Annual Reports.[6]

The subtle difference in the title "Long Term Study of Health Impacts" and the actual requirement as outlined in the EA Terms and Conditions caused some confusion within the community and raised expectations for a "health study." The CLC has discussed various health concerns since its inception in 1997 (Appendix 3). The CLC also hired its own consultants to review the original CanTox assessment, but the Certificate of Approval (CofA) does not require formal health representation on the CLC.[7] Although CanTox has continued to report on its updated risk assessment, health has continued to be of concern to the CLC.

Continued community input into, and communication about the results of, the ongoing health risk assessment was intended to take place through the CLC as indicated in Schedule "I." Because it lacks expertise in health, however, the CLC has not served effectively as a venue for expression and resolution of on-going health concerns.

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[4] The details about the health component of the environmental assessment and the discussion since that time can be found in Appendix 1 of this report.

[5] EA Terms and Conditions # 8. "Long Term Study of Health Impacts." A health risk assessment is a form of health study that uses predictive models to assess future health impacts and does not directly measure health effects in the impacted community.

[6] These Reports are reviewed by both the MOE and Regional Public Health. The CLC also receives the Annual Reports.

[7] Item #72 of the CofA.

The Panel recommends* that *Schedule "I" be considered as a component of the Certificate of Approval for monitoring purposes (page 58 Final Report).

There is no formal relationship between the MOE and the local public health authority. Resources are strained in both agencies. Colin Isaacs, who was retained by the Company to undertake a study of relations with the local community, recommended that "the Company provide funding to the CLC to enable it to hire an environmental expert who can act as an advisor to the CLC. The role would be .... to interpret ...health effects data.... [T]he expert [would be] familiar with...the results of health studies..."[8] The Public Health Unit is investigating its role with respect to landfills, as there currently is no mandated role for ongoing involvement[9] unless there is clear evidence of a hazard present.[10]

Formally appointed, independent, on-going health expertise needs to be available to assist the community and the MOE to interpret monitoring results, make decisions about new chemicals to monitor, interpret changing standards, interpret relevant health information etc.[11] New funds may be required to implement this recommendation.

The Panel recommends a number of changes to support the CLC in functioning more effectively as a watch-dog for the community, including a health sub-committee which would enhance communication on health issues (pages 66-67 Final Report).

The panel recommends a process for raising and resolving ongoing health concerns through an adequately supported sub-committee of the CLC (page 59 Final Report).

The Taro Landfill Health subcommittee would build on the existing Community Health Impact Prevention Programme as defined in Schedule "I" and provide the CLC with access to and input from individuals with health expertise at the Region,[12] academic researchers, the local health community, and the Company's health risk assessment experts (currently CanTox). In addition, as needed, the occupational health providers who work with the Company could be invited to be a resource to this committee on issues of worker health protection.[13] Concerned citizen members would also be invited to participate on this committee.

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[8] Colin Isaacs, "A Plea for Real Communication." July 1999, p. 26.

[9] Personal communication Robert Hall, Acting Director, Environmental Health Branch.

[10] The Provincial Health Hazard Investigation Program in the Mandatory Health Programs and Services Guidelines requires a health department to consult with and provide advice to the community about health hazards when such health hazards are identified. Other health hazards in the Region may take priority for the use of limited resources.

[11] In his report (p. 12) Colin Isaacs recommended a representative of the Regional Health Department on the CLC. ATSDR published a book on *Learning From Success: Health Agency Effort to Improve Community Involvement in Communities Affected by Hazardous Waste Sites* which recommends a proactive role for health agencies.
There are a number of Ontario examples of health expert involvement in landfills such as Brock West (Brock West Landfill Site, Public Health Assessment, March 1996) and other areas of public environmental concern. For example, a Health Studies Advisory Panel has been proposed for the Port Hope community (Canadian Nuclear Safety Commission News Release, August 22, 2000) that would "formally consult with the community, evaluate information from current studies and make recommendations on the need for and direction of future studies."

[12] Additional health unit resources for this committee will need to be negotiated.

[13] The current occupational health service for the Taro Landfill workforce is reviewing their medical

Section 3.0

Environmental Health: Living Near Landfills: Understanding and Action

Environmental health practice involves understanding environmental threats to human health and taking actions to prevent or reduce these threats. Often the actions required are urgent or important and need to be taken before complete scientific understanding has been achieved. Continuous updating of information cannot guarantee safety but can provide more confidence in the boundaries of uncertainty and reassurance that, wherever possible, actions are taken to protect health according to the precautionary principle.[14]

Toxic constituents can cause health effects if they are released into the environment and travel along pathways to reach individuals who are susceptible to the amounts and types of contaminants to which they are exposed. There is much uncertainty surrounding this issue:

Understanding:

- What constituents are present which could be released?
- What pathways can/do they follow?
- What routes of exposure can they take to impact upon humans?
- Which individuals are susceptible?
- What biological effects do these constituents cause?
- Are the effects noticeable/measurable?
- Are the effects damaging to health?

Action:

- Are there effective strategies, which can mitigate or prevent damaging health effects through source, pathway or exposure measures?
- Are these strategies feasible (acceptable, affordable, safe, etc.) in the specific situation of interest?

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surveillance protocol with the view to including similar biological measures as used for other workers in the Company.

[14] The precautionary principle, which was adopted as Principle 15 of the Rio Declaration at the Earth Summit in 1992, states: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

Section 4.0

Landfill Health Assessment: Information from the Literature

Landfills have the potential to cause health effects through a number of "pathways" (Health Canada). The primary ones investigated are the routes that chemical contaminants placed within the landfill could escape (i.e., through water and air). There are also potential exposures from leachate transportation and disposal. In addition, there are potential health effects from the uncertainty associated with the siting process (Wakefield and Elliot, 2000), the site itself (Neutra, 1991) and the ongoing relationships between the landfill and the communities upon which it impacts.[15]

Health assessments consider the exposures themselves (sources, constituents, pathways), the populations at risk of exposure, and the potential or reported health effects associated with the exposures and populations.

Improvements in waste disposal practices have reduced the potential for landfill contaminants to cause ill effects. At the same time, concerns about the accumulative effects of very low dose exposure to multiple chemicals have focused attention on sites which are much better built and managed than in the past but still may allow some contaminant(s) escape.

The range of outcomes that can be studied include deaths, diseases such as cancers, and self-reported symptoms such as headaches. It is important to note that there is no sentinel (i.e., specific) health outcome that can be used to indicate problems directly attributable to landfills. It is also crucial to recognize in these types of investigations that the exposures which are clearly ascribed to landfills can differ substantially with respect to the types and quantities of contaminants that can potentially escape from any given landfill. Most studies reviewed by the Panel have used a crude measure of exposure, namely residence or proximity to a landfill. Some have used environmental monitoring data for exposure. None of the studies reviewed to date used landfill sampling or biomarkers in measurement of exposure.

Health effects from landfills have been studied extensively in the literature. A recent review (Vrijheld, 2000) concludes:

> Increases in risk of adverse effects (low birth weight, birth defects, certain types of cancers) have been reported near individual landfill sites and in some multisite studies, although biases and confounding factors cannot be excluded as explanations for these findings, they may indicate real risks associated with residence near certain landfill sites. A general weakness is the lack of direct exposure measurement. An increased prevalence of self-reported symptoms such as fatigue, sleepiness, and headaches among residents near waste sites has consistently been reported in more than 10 of the reviewed papers. It is difficult

[15] ATSDR, "Report of the Expert Panel Workshop on the Psychological Responses to Hazardous Substances," September 2000.

> to conclude whether these symptoms are an effect of direct toxicological action of chemicals present in waste sites, an effect of stress and fears related to the waste site, or an effect of reporting bias. Although a substantial number of studies have been conducted, risk to health from landfill sites are hard to quantify. There is insufficient exposure information and effects of low-level environmental exposure in the general population are by their nature difficult to establish. More interdisciplinary research can improve levels of knowledge on risks to human health of waste disposal in landfill sites. Research needs include epidemiologic and toxicologic studies on individual chemicals and chemical mixtures, well-designed single and multisite landfill studies, development of biomarkers, and research on risk perception and sociological determinants of ill health.

Ontario examples of health studies of residents living near landfills include the Upper Ottawa Landfill (Hertzman, 1987) and Brock West Landfill (Panaro, 1996). Elliott (1997) measured the change in concerns over time at the Halton Municipal landfill and found that, "although 50% (of the original group) remained concerned, many had adapted to the facility or at least had become resigned to it." Wakefield and Elliott published a paper on the East Landfill siting process compared with another local proposal that was not approved (Wakefield and Elliott, 2000). They reported levels of concern about health at the Taro East Landfill to be higher than the other similar site. Dr. Elliott has a research grant to gather and analyze concerns of residents in the neighbourhoods around the Taro facilities through two telephone surveys.[16]

[16] One survey was completed in 1994 and one is planned for 2000. [Personal communication from Susan Elliott to Fran Scott, July 2000.]

Section 5.0

Exposure Assessment

Contaminants have the potential to cause human health effects to persons living close to a landfill, if the contaminants escape (now or in the future) en route to the landfill, while in the landfill through release to the atmosphere or if they escape to neighbouring soil, ground or surface water. Chemical reactions of constituents within a landfill could also create new contaminants that could pose risks. In addition, contaminants from other landfill activities such as truck and equipment emissions could pose risks.

The CofA for the Taro East[17] Landfill requires environmental monitoring of leachate, ground and surface water, combustible gases and air quality. Not all of these parameters are monitored because of human health concerns: some may be required for ecosystem monitoring, landfill operations or for leachate disposal. With respect to human health, the pathways of concern are water, air and soil.

Certain constituents have been chosen by the MOE for the Landfill's monitoring programs. The CanTox Community Health Assessment was based on information about the West Landfill waste stream, West Landfill leachate and air monitoring, waste stream registries and community concern.[18] Samples of waste accepted by the East Landfill do not appear to have been used to establish monitoring criteria. Nevertheless the data would suggest that with respect to health related issues, the leachate quality is better than the initial expectations.

Decisions of what to include in the various monitoring programs are made primarily by the MOE and listed in the CofA. As part of their testing protocol, the consultants report on a wider spectrum of parameters than required. CanTox annually reviews the monitoring results and identifies any new constituents to include within its human health risk assessment. CanTox also reviews the literature to identify any changes in exposure standards or guidelines.

There does not appear to be a routine process to review the overall monitoring programs to ensure that these programs reflect what is going into the landfill, what might be coming out of the landfill and/or any new contaminants of concern. The Regional Public Health Unit expressed concern in 1995 that a changing waste stream could lead to changes in testing needed.

The monitoring parameters need to be reviewed on a regular basis to ensure that new parameters of concern are added and parameters not required are dropped. For example, the US agency charged with establishing priority substances in terms of threat to human health (Agency for Toxic Substances and Disease Registry [ATSDR]) lists arsenic, lead and mercury as its top three priority substances.[19] List B of the Certificate of Approval which dictates the parameters for leachate and groundwater includes lead, but not arsenic or mercury. Surface water monitoring requires all three parameters. The most recent

[17] Schedules C, D, E, F, G.
[18] CanTox Community Health Assessment.
[19] CERCLA list: http://www.atsdr.cdc.gov/99list.html.

Annual Report (1999) includes more monitoring than required in that arsenic levels are reported in groundwater and surface water; lead levels in air, leachate, groundwater, and surface water; and mercury in surface water. The levels of mercury in the surface water were very low. However, this is an example where enhanced testing of the leachate may be of value to determine the levels of mercury (which, based on other findings, are expected to be low.)

Schedule "I" notes that the monitoring will follow schedule "C," "E," "F" and "G" and that the results should be compared with Community Health Assessment assumptions.[20] It notes further that "if the monitoring identifies a chemical not considered in the Community Health Assessment Study, then a detailed Review ...will be conducted."[21] The Schedule does not indicate how new chemicals are added to the monitoring program or even whether the Health Assessment itself should recommend a change in the monitoring program.

The Company produces Annual Reports, as required by the CofA, which provide a summary of the monitoring done by its consultants. None of the MOE test results appear in these reports. The Annual Reports are provided to the CLC for review and discussion.

The Panel recommends that a comprehensive monitoring protocol be developed by the MOE with input from the CLC and the Company's risk assessment experts. The protocol would serve as a template for reviewing all of the individual monitoring schedules in order to make decisions about adding or removing substances.

This protocol should be reviewed at least annually in light of new information including updates from Health Canada, ATSDR and other relevant parties (page 58 Final Report).

5.1 CONTAMINANT EXPOSURE MONITORING

Residents living around the Taro East Landfill could be exposed to contaminants that might escape from the source (the waste streams) and travel along the "fluid" pathways of water and air. The Taro East Landfill operation has collected information on the characterization of the incoming waste and outgoing leachate and air.

5.1.1 Waste Stream Monitoring

The contaminants that are within the waste stream or landfill are "contained" and are not a health risk unless they escape. Concerns were expressed in the EA process that changing waste streams or fill would need to be identified.[22, 23] The main consideration for testing the waste stream is to identify contaminants that could escape in order to make

[20] Section 2.1.2, Schedule "I".
[21] Section 2.1.4 (a), Schedule "I".
[22] Regional Public Health.
[23] Review by Dr. Chris Walker, "The matter of long term stakeholder monitoring of the fill as it may vary over time..." March 16, 1995, p. 1.

informed decisions about managing the landfill/waste stream or the monitoring protocol. Testing the waste stream on entry to the landfill can also provide additional information to guide the exposure monitoring protocol.

5.1.2 Leachate Monitoring

Leachate is a potential pathway for contaminant exposure to landfill workers, proximal residents and workers/residents along the disposal route. CanTox considers this pathway in their risk assessment for the accidental ingestion of East Landfill leachate. Leachate provides an early warning system for potential breakdown of waste stabilization as well as an indicator of changing waste streams. The leachate from the West and East Landfills are routinely monitored for a variety of contaminants through samples sent to Taro and MOE labs. At present, the only potential East Landfill leachate exposure pathway for residents would be from release of leachate due to an accident involving one of the trucks carrying leachate to Brantford for treatment.

Although an extensive scan for organic and inorganic chemicals in the leachate is routinely performed as part of the ongoing monitoring activities, given public concern, the Panel has recommended additional leachate monitoring (page 28 Final Report).

5.1.3 Ground and Surface Water

Contaminated surface water is a pathway for exposure to workers and proximal residents if it escapes from the landfill. Groundwater is a potential pathway for West Landfill leachate only for proximal consumers of well water. There is one family still using a well for domestic purposes. CanTox did not consider this pathway to human exposure in their risk assessment as it was not associated with East Landfill leachate. The ground and surface water discussions are presented in the Panel's Final Report (Sections 8.3.5 and 8.3.6). These results do not indicate an increased health risk through potential exposure at this time.

Environmental monitoring of groundwater and surface water should continue. The Panel's recommendations appear in the ground and surface water section (pages 44-45 Final Report).

5.1.4 Air Monitoring

Air is a pathway for contaminant exposure to workers and proximal residents. CanTox considers this pathway through inhalation (and ingestion/dermal contact through air contamination of soil and food) in their risk assessment. Air monitoring for metals, TSP, meteorological conditions and Volatile Organic Compounds (VOCs) is routinely done by Taro consultants. Three air monitors are permanently in place close to the East Landfill. There is no routine MOE air particle monitoring around the Landfill.

Assessment of VOCs was carried out by the MOE TAGA unit in December 1999 and June 2000. Results from this monitoring are summarized in the Air Section of the Final Report. These results do not indicate increased health risk through air exposure. However, continued MOE air monitoring of metals (page 52) and VOCs (page 53 Final Report) is recommended.

Total suspended particles (TSP) are measured primarily because of the concern of reduction in visibility associated with particles in the air. The human health risk due to air particles is associated with smaller particles that can be inhaled (i.e., those less than 10 microns in size). The evidence is not clear whether health risk increases because of the size of particle or the substance of a particle (e.g. whether it is a product of combustion). CanTox has estimated what proportion of the TSP measured is small or very small particles,[24] but there have been no direct measurements of small particles ($PM_{10/2.5}$) around the Taro East Landfill.

The Regional Health Unit commented on the need for small particle monitoring in its initial review of the Community Health Assessment (Appendix 1) and reiterated this recommendation in its review of the Bertell/Dixon report.[25]

The Bertell/Dixon report recommends to the CLC, "...that it ensure that air monitoring is carried out in a manner which independently measures the fence-line concentrations of the airborne chemicals and particles arising from landfill operations."[26]

In the Panel's final report, monitoring of small particles and their chemical composition is recommended for inclusion in the air monitoring schedule. An additional air monitoring station that can be placed in proximal residential areas is also recommended (page 51 Final Report).

It is important to note that there are many sources of air pollutants in the Taro neighbourhood (local, regional and trans-boundary) depending on the shifts in wind directions. Measurement of specific contaminants or particles in the Taro air monitoring stations does not identify the source.

5.1.5 Odour Monitoring

Unpleasant odours from landfills can be viewed in communities as a psycho-social health concern as well as a nuisance as they act as a reminder of the landfill presence and some residents associate health issues with them.[27] Although the odours expected from an industrial landfill site are much reduced compared with a domestic landfill site, some of the waste streams have significant odour. Odours have been documented as a problem

[24] CanTox 2000, p. 5.
[25] July 28, 1998 letter from Bill Hunter to C. D'Angelo, p. 2.
[26] Bertell/Dixon Report April 2, 1998, p. 39.
[27] Shusterman D, 1991, 1992.

through the complaints registry.[28] Management of odours has been done through changes in waste stream[29] and masking technology.[30]

Monitoring for odour is difficult since there are no technologies for assessing the subjective and variable perception of odour. In Taro's response to the Nash neighbourhood development.[31] Mr. Wayne Jackman indicated a number of "efforts underway at the site to deal with odour," including "an odour control procedure developed and reviewed at the CLC level." The CLC minutes record, "As well, they (Taro) have advised that Professor Martin Marston of McMaster University has been retained to provide additional guidance on the matter of odours."[32] There is documentation of further odour complaints at the CLC, primarily through the MOE Inspector's report but there is no formal place on the CLC agenda for ongoing discussion about the effectiveness of the overall odour control procedure. Odours will continue to be an issue as development proceeds around the site.

In addition to a number of odour reduction strategies, the Panel also recommends that the CLC continue to consider odour to be an area of ongoing importance and to identify goals for the odour abatement program (including the design of a formal evaluation that could include sentinel sites called on a regular basis for odour reports) (pages 54-55 Final Report).

5.1.6 Biological Exposure Monitoring

Biological exposure monitoring is used in environmental or occupational health surveillance or studies when there is adequate information on individual exposure and valid evaluation tools are available. An example of this use of exposure "biomarkers" is the measure of heavy metals such as lead in blood samples. Biological exposure monitoring cannot usually determine the source of contaminants measured.

No human biological exposure monitoring of Taro community residents is being done at the current time. The Panel heard of individual residents who sought out limited exposure monitoring through their own physicians. Landfill workers do not currently have exposure monitoring done as part of their occupational health and safety requirements for either the landfill or quarry operations although workers at waste processing plants do.[33] There is potential for expansion of the medical monitoring program to include heavy metal monitoring for landfill workers, as discussions are currently underway between the Company and their occupational medical consultants. Workers can be considered proxy individuals for community exposure and health effects (see below) as they are in close proximity to the contaminants and often have more chronic exposure to (presumably) higher levels of contamination than residents who live further away and who might work off-site. But extrapolation of information about workers to residents must be done very

[28] Inspectors reports.
[29] Brad Farnand's report and personal communication Wayne Jackman.
[30] Personal communication Wayne Jackman.
[31] Letter May 20, 1998 Wayne Jackman to Steve Miazga Re: Secondary Plan Issues.
[32] Planning Department Report No. PLT98-29 Item 6 (a).
[33] Personal Communication Dr. Greenspoon, Wellington Medical Centre, Hamilton.

cautiously as workers are often a homogenous group of mostly healthy men of a limited age range who have access to personal protective devices and who may choose to move/change jobs if concerned about potential health effects. Decisions about the occupational monitoring program could be shared with the health sub-committee, provided confidentiality of individual workers results was respected.

Section 6.0

Populations Impacted by Taro Activities

There are a number of communities impacted by the Taro Landfills and associated activities. Although there were attempts to reach these groups through the EA process (via the Study Group and public meetings) and through the CLC, some CLC members have suggested that the health study should "go to the people who are being affected primarily."[34]

CanTox did not identify an existing population as they considered only hypothetical exposed individuals in their risk assessment.[35] The populations who have had potential exposure in the past, currently are exposed, or could be exposed in the future are not explicitly identified. Geographic boundaries for residents potentially impacted by the landfill were set by the CofA as within 1500 meters of the site and within 500 meters of the designated haulage route for the purposes of CLC membership.[36] The EA document identified approximately 101 residences within 500 m of the Proposed East Quarry Landfill and another 466 residences between 500 m and 1000 m.[37] The site is located within Ward 1 of the City of Stoney Creek with a population of approximately 17,000.[38] In his report on the community impacted by the Landfill, Isaacs chose street boundaries for sampling.[39] The Stoney Creek Planning Department estimated the area will grow over the next few years to a population of about 30,000.[40]

Persons living within the defined impact boundaries around the landfill and along the haulage routes could be registered in some manner to identify and keep in touch with them. Persons who have moved out of the community could possibly be identified. Previous residents who lived in the vicinity of the West Landfill, West Quarry, or Ashphalt plant could also be included. People who move into the community in the future, particularly in new residential areas planned for the area, could be identified and invited to be registered if such a registry was created. Persons working at the landfill or quarry or those interested for other reasons also could be included in the registry.

A registry such as this could be a useful communication database, and could also provide a population for sampling or follow-up of health or other concerns. However, a registry would require sufficient resources to create and maintain. It would need to be managed by an agency accepted by all stakeholders, and would need clear policies and procedures to ensure appropriate and confidential use of the information contained within. There is the potential for the registry to cause harm in that it could be seen to imply that health

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[34] November 17, 1999 CLC Minutes. Several individuals told the Panel that they are dissatisfied with the health assessments done through CanTox.
[35] CanTox Community Health Assessment 1995.
[36] CofA Section # 72.
[37] Taro Aggregates Ltd. Proposed East Quarry Landfill Environmental Assessment Volume II, January 1995, p. 84.
[38] Personal communication to Panel from Doug Conley, July 4, 2000.
[39] Isaacs op. cit.
[40] Personal communication to panel Steve Miazga August 29, 2000.

problems will arise in the future. Careful communication around the objectives of the registry would be essential. More discussion about the possible uses, benefits and drawbacks of such a registry is needed before the health sub-committee could act upon this idea.

Section 7.0

Health Effects Monitoring

7.1 ONGOING HEALTH RISK ASSESSMENT

The Company has undertaken an ongoing health risk assessment process by hiring CanTox, a consultant agency whose expertise is in risk assessment. This is a standard means used to predict health effects using estimated and measured exposure data, toxicological and epidemiological evidence where available, standards set by government agencies where available and mathematical modeling within a set of assumptions about populations at risk, exposures and pathways. The reviews of the Health Assessment study done for the EA found this approach to be reasonable with some caveats. Some members of the CLC and its consultants have expressed concerns about this approach because of the uncertainty around the setting of standards, the lack of human evidence, the challenge of combining individual risk assessments and the narrow focus on certain health outcomes.

There have been stories reported in the media, at the CLC, and to the Panel, of individuals and "clusters" of people with health problems (Appendix 6 of this report). These problems are attributed to the landfill. Some individuals have sought medical help for these problems but have not sought assistance from the public health authorities for investigation as far as the Panel could tell. There has been no direct systematic assessment of health effects of populations potentially at risk because of landfill exposure. The landfill workers are assessed through the Company's occupational health services.[41]

7.2 DISCUSSION OF A HEALTH STUDY

During the EA process, the Regional Health Unit expressed the view that a "modified health study" should be done. In response, Dr. Tee Guidotti, formerly with the University of Alberta, stated, within his review of the Community Health Assessment, that "Given the very considerable harm that could be done, a meaningless community health assessment is not advisable and carries risk for the credibility of the health assessment itself as well as all parties directly affected by the proposal."[42] It is interesting to note that five years later, the Taro community has suffered some of the very consequences that Guidotti warned against including "mistrust of authority (including public health agencies), disruption of civic life and perpetuation of ongoing schisms, and apathy and anxiety" despite the fact that a "modified health study"[43] was not carried out.

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[41] The landfill workers are assessed on routine basis with chest x-rays and pulmonary function tests: personal communication Dr. Greenspoon, Wellington Medical Centre.

[42] Letter Dr. Tee Guidotti to Mr. Herman Turkstra August 30, 1995, p. 5.

[43] Letter Dr. Tee Guidotti to Mr. Herman Turkstra August 30, 1995, p. 3.

A similar concern to Guidotti's about the small sample size was also mentioned in the CLC minutes.[44] Bertell and Dixon noted in their review "A fully fledged epidemiological study of an observational case-control format is not appropriate here."[45]

In 1998 Bertell/Dixon recommended to the CLC, "...that it consider ways and means of implementing an on-going health surveillance study."[46] The Panel discussed with these consultants the issues of the separate stages of health assessment: pre-operational theoretical considerations, operation of a new facility, and closure of a facility.[47]

The Regional Health Unit stated in their review of the Bertell/Dixon report "We, therefore, concur with the view that careful unbiased systematic surveillance and monitoring, as suggested in recommendation three, is a useful and proactive measure."[48] However, in the Public Health response to the Nash neighbourhood development proposal, the question of sample size was once again expressed: "The actual number of residents living adjacent to the perimeter of the West Quarry is relatively low and may not provide satisfactory statistical power, even before factors such as tobacco use, diet, occupation and previous residence are factored in."[49]

The 1995 CanTox Community Health Assessment Study presented the "possibility that some minor respiratory irritation may be experienced by the most sensitive individuals if they are present on or directly adjacent to the Taro property under conditions favourable to formation of fugitive dust emissions." The results of the air quality monitoring data collected during 1998 validate this concern.[50] Nevertheless, there has been no specific follow-up to test this prediction with studies of residents around the landfill.

Bertell/Dixon recommended to the CLC[51] and to the panel "that it consider ways and means of implementing an on-going health surveillance study. A recommended protocol is based on the establishing of biomarkers as early indicators of atypical physiological conditions."[52] The use of specific biomarkers was not elaborated upon. Mr. D'Angelo re-iterated this request in his list of questions to the Panel.[53]

7.3 BIOMARKERS

CanTox discussed the question of biomarkers at its meeting with Dr. Bertell and Mr. Dixon and according to minutes prepared by CanTox, "no decision was made on whether or not a health surveillance or biomarker study should be conducted or who should be expected to pay for the study. It was agreed that CanTox Environmental could provide Dr. Bertell and Mr. Dixon with data on the biomarker endpoints that may be meaningful

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[44] CLC Minutes Appendix 3 of this report.
[45] Bertell/Dixon Report April 2, 1998, p. 4.
[46] Bertell/Dixon Report April 2, 1998, p. 39.
[47] Dr. Rosalie Bertell Handout "Health Monitoring at Stoney Creek" July 4, 2000.
[48] Letter of July 28, 1998 from Regional Public Health to C. D'Angelo.
[49] Letter from William Hunter to Steve Miazga.
[50] CanTox Community Health Assessment Review 1999, p.6.
[51] Bertell/Dixon Report, p. 39.
[52] Brief to panel: July 4, 2000.
[53] Question #20.

for the chemicals that were assessed in the CanTox Community Health Study."[54] The Public Health Department commented "as yet, there are no agreed upon biomarkers related to the types of exposures envisioned in the Taro landfill. Consequently, it is unjustified to conduct surveillance without a well-defined, specific and valid set of biomarkers."[55]

Biomarkers of effect are morphological, physiological or biochemical changes that have occurred as a result of exposure to substances foreign to organisms (xenobiotics). An example is changes in kidney function as a result of occupational cadmium exposure. Bio-markers of health effects could be included for respiratory function, but beyond that would need careful consideration as more information becomes available. As part of the work of the health sub-committee, information from the environmental monitoring program as well as from this rapidly developing biomarker research field will be considered on a regular basis.

7.4 POTENTIAL FUTURE HEALTH STUDY

It is possible to do a health study at this site. There is extensive environmental exposure data available that could be linked with human biological exposure and health effects, although the current exposure estimates demonstrated no evidence of elevated contaminant levels that would be associated with effects. It is not yet clear that all contaminants that could escape from the site are being monitored.[56] although there is equally no reason for concern that anything significant is being missed. In addition, the more comprehensive definition of health (which would include psycho-social aspects such as stress) has not been assessed. In its draft Canadian Handbook on Health Impact Assessment, Health Canada lists a set of environment/biological indicators (monitoring) for landfills. Included are "complaints" and "perceptions."[57]

McMaster University researchers Drs. Jerrett[58] and Sears[59] have ongoing research programs into the health impacts of air quality in Hamilton-Wentworth. The Taro community has been partially included in their studies of mortality, health utilization and self-reported symptoms and medication use in children. The Panel has met with these researchers, who were enthusiastic about the possibility of including specific research questions and "over-sampling" of the population in future respiratory health studies which could include clinical measures of lung function as well as the additional analyses of geographic mapping of health outcomes. Dr. Bob Willis of CanTox independently

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[54] June 1, 1998 Minutes, p. 6.

[55] July 30, 1998 letter from William Hunter to Carmen D'Angelo.

[56] The Panels report takes a precautionary approach and addresses this issue with a recommendation.

[57] Decision Making in Environmental Health Impact Assessment, December 1999, Volume 2, p. 190 http://www.hc-sc.gc.ca/ehp/ehd/ocha/tech_report.htm.

[58] M. Jerrett, "Air Pollution, Environmental Equity and Health: A Spatiotemporal Analysis." Funded by the Toxic Substance Research Initiative of Health Canada (1999-2002) Appendix 4 of this report.

[59] Habbick, B.F., Pizzichini, M.M., Taylor, B., Rennie, D., Senthilselvan, A., and Sears, M.R. Prevalence of asthma, rhinitis, and eczema among children in 2 Canadian cities: the International Study of Asthma and Allergies in Childhood. *CMAJ* (1999) 160(13):1824-1828.

suggested that Taro health studies could be "piggy-backed" onto ongoing air quality and health research.[60]

Development and design of a health study requires a functional committee to identify objectives, accept limitations of sample size, time, validity of tools etc., optimize information collection and set clear interpretation protocols to ensure the study is a valid useful product. **If this is not done, the health study has the potential to do harm by contributing to further uncertainty and worry. It might also occasion further conflict over direct and indirect costs.**

The important questions the CLC needs to consider are:

- Is it feasible to gain valid useful information through such a study?
- Will the information gained be used to promote health in the community?
- Would the resources required to do a study be better utilized in moving directly to health promotion and protection strategies?

The Panel considered very carefully the CLC request for a health study and consulted with a number of experts, key informants (including community members with health concerns) as well as the literature.

The ATSDR (Agency for Toxic Substances and Disease Registry), the US agency charged with assessing health risks from toxic substances, has produced a guidance document to consider in designing health studies for communities that might be exposed to hazardous substances.[61] The document suggests:

> When the decision to conduct a health study is being considered, the following criteria should be used to determine the type of health study:
> - Characterization of environmental contaminants by type, media and concentration levels.
> - Documented evidence of human exposure at a level of concern.
> - Level of current knowledge about the relationship between exposure and specific adverse health outcomes.
> - Documented excess of an adverse health outcome, when known.[62]

In consideration of the first three points, the Panel concluded that there were no strong reasons to recommend a health study. The characterization of the incoming waste and outgoing leachate and air has been done by the Company (primarily) and by the MOE. As discussed further in this report, there is currently no documented evidence of human exposure at a level of concern. CanTox has continued to annually review current knowledge and has predicted that there will be no specific health outcomes which would require further investigation.

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[60] Bob Willis PhD Meeting with Panel, May 2000.

[61] http://www.atsdr.cdc.gov/HS/gd1.html The document has a section on "Considerations for Proceeding With A Health Study" listing the following factors: "public health significance, community perspective and involvement, scientific importance, ability to provide definitive results, resources, contribution to program goals (superfund), and authority and support."

[62] ATSDR does not define "excess" in this statement.

On this final point, the Panel felt there was a lack of reliable information or systematic documentation of adverse health outcomes. Health outcomes of concern can have multiple causes and much expected geographic variability. Documentation of a number of local health outcomes such as cancer around a landfill is not sufficient evidence that there is a local problem. The concept of "excess" outcomes occurs when a community beside a landfill is compared with another similar community. If there is more of the health outcome of concern (such as cancer) in the community close to the landfill, then further study is required to identify if this difference occurred by chance (statistical testing) or whether other factors (such as age, gender, occupation, lifestyle, socioeconomic factors, etc.) could explain the observed "excess." A recent study of cancer in the Port Hope community is an example of this kind of environmental investigation.[63]

Although the monitoring results demonstrate only low current levels of exposure, the Panel heard of a number of health concerns expressed by members of the community. Moreover, there are still outstanding questions about historical exposure from the West Landfill and uncertainty as to whether monitoring and predictions can comprehensively assess all aspects of health, including psychosocial health.[64]

As a component of the community health assessment, there has been no estimation of the size of the exposed population in order to calculate whether the relevant sample size is available to establish if "excess health outcomes" are present.[65] No comparative study of the health status of the community has been done to identify if "excess health outcomes" have occurred.

Spatial analysis is an important area for health assessment in environmental health. Details on this type of analysis are available in Appendix 5 of this report.

A type of modeling that may be relevant to the Taro neighbourhood deals with the intensity of *point patterns* over space. This type of modeling addresses the hypothesis that the intensity of point clustering in a given area differs significantly from a random (or control) pattern observed in the entire study area. For example, we might investigate the clustering of a mortality associated with respiratory disease, or illness associated with asthma or other respiratory disease known to be linked to an environmental contaminant. This approach could help identify disease or mortality clusters that may appear in proximity to the Taro Landfill, or other sources such as the steel industry in the north end of the city. One major limitation of point pattern models arises from the nature of the data. Point events by definition carry information about the event (usually disease or death at that location) that cannot be adjusted easily for other confounding factors such as age. Given the important role age plays in health and survival experience, this is a major shortcoming. Similar GIS analysis could be conducted to focus on potential clustering of

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[63] Cancer Incidence in Port Hope 1971-1996 – this report was provided to the Panel by William Hunter, Ministry of Health.

[64] Report of the Expert Panel Workshop on the Psychological Response to Hazardous Substances September 2000.

[65] An estimated power calculation has been done for the panel that confirmed there is a large enough population proximal to the landfill to do both the GIS and ISSAC II-type health studies (M. Jerrett, personal communication).

mortality and asthma rates in the Taro neighbourhood in comparison with other parts of the Region.

There is also reason to consider further study of children's respiratory health. There is a relatively high density of young families with school age children living within a 1.5 km radius of the Taro Landfill. Young children breathe more rapidly and inhale more pollutants per kilogram of body weight. Children spend more time engaged in vigorous outdoor activities compared to adults, and because of this they risk greater exposure to contaminants.[66] Children have a higher prevalence of asthma than adults. Asthmatic children appear to be more sensitive to air pollutants such as sulfur dioxide, $PM_{10}/PM_{2.5}$ particles and ozone. Associations have been found between air pollution and respiratory disease in children. Exercise, duration of pollution exposure and the combination of pollutants inhaled have additive effects.

The chronic respiratory health effects in children associated with air pollution are unclear. There are confounding factors such as smoking, prematurity, low birth weight, race, poverty and gender. An acute decline in lung function is found in children who live close to high traffic areas as a result of particles and/or sulfur dioxide exposure, and this decrease in function can persist for several weeks. The effect of pollution on lung function is smaller than the effect of maternal smoking. In general, there is a decrease in pulmonary function found in those who live in places with high sulphur dioxide or particle levels; however, there is little known about the effects of air pollutants generated from non-hazardous or hazardous landfills.

The potential study of pulmonary function in children living in the area surrounding the Taro Landfill relative to the Hamilton-Wentworth region could serve to further understanding of the causal linkages between air pollution and children's respiratory health.

The Panel is recommending that a health study program be undertaken in conjunction with other research to permit comparisons with people living in other parts of the Region and country. Linking with an ongoing research program ensures that the results can be properly interpreted and also can reduce costs. The results of this study program would not establish a causal link between the landfill itself and health outcomes but indicate whether there was a difference in the health status of the community living close to the landfill compared with similar populations who were not living beside the site.

The health study program could include, for example, one or both of the following proposed studies (page 61 Final Report).

1. Analyze historical mortality and disease information over the past 15 years within the Region. This study is currently ongoing and funded by the Health Canada Toxic Substance Research Initiative.

2. Assess children's respiratory health linked with air quality. This study would be able to investigate if there was any impact of fine particles[67] and other local air pollutants on

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[66] S. Schwartz and G. Chance, "Children's Special Susceptibility: Children First," CICH 1999.

[67] Monitoring of fine particles is recommended in the Air Quality section of the Final Report (Section 8.3.9.4.1).

children's lung health. This study is a follow-up of an international assessment of air quality's effects on children's health. This study would include assessment of clinical lung function as a biomarker of effect as well as psychosocial concerns as well.

The budget and funding sources for these studies will need to be negotiated by the CLC once the health sub-committee develops the detailed study program proposal. The Company presented a Ten-Point Plan to "address concerns of Stoney Creek Residents" which includes Point One: "Taro will support an independent community health study."[68]

Environmental health researchers currently working in these areas have expressed strong interest in expanding their research to include these two proposals. The proposed health sub-committee of the CLC would act in an advisory role for this study program.

[68] Documents Related to the Terms of Reference Provided by Taro April 13, 2000.

Section 8.0

Health Management: Reduction or Prevention of Exposure to Landfill Contaminants

Exposure to contaminants at a landfill can be reduced or eliminated through appropriate management strategies. The current design and operation of the landfill meets most requirements such that exposures from the East Landfill are very low. There are a few areas where improvements could be made and these are discussed in the Panel's Final Report: design, air, leachate, land use and transportation. This section includes recommendations on asbestos and medical management.

8.1 ASBESTOS

Concerns about asbestos have been raised by the CLC,[69] the environmental inspector[70] and in the Bertell/Dixon report.[71] Asbestos only poses health concerns if it becomes airborne. Direct skin contact with asbestos, or contact through water, are not health risks. Asbestos is considered a non-hazardous waste in Regulation 347 and therefore eligible for disposal in the Taro East Landfill. There was concern early in 1999 that some asbestos had been generated from outside of the Region.[72]

Asbestos Tonnage Disposal at Taro[73]

	1997	1998	1999	Total
Dofasco	31.59	667.05	14.24	712.88
Philip	270.18	9824.36	82.39	10176.93
Other H-W	2642.13	475.2	826.7	3944.03
Total	2943.9	10966.61	923.33	14833.84

The landfill has received asbestos since its opening but it is predicted that the amount will decrease over time as the local area exhausts its generation of asbestos waste through other abatement methods such as encapsulation.[74]

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[69] Memo May 15, 2000, question #19, p. 7.
[70] Brad Farnand summary report for panel.
[71] Bertell/Dixon Report April 1998, pp. 7-8.
[72] Letter from Brad Farnand in 1999 Annual Report.
[73] From Section #7 Information supplied to Panel, May 8, 2000.
[74] Personal communication Wayne Jackman, July 18, 2000.

The Panel investigated the concerns about asbestos to identify if air or dust-fall monitoring could pick up non-compliance with the asbestos handling regulations. There are no current methods for accurately measuring asbestos fibres in outdoor environments.

The Panel recommends that the on-site inspector should inspect and report, on a regular basis, compliance with the Certificate of Approval concerning asbestos receipt and asbestos handling procedures (Regulation 347 Section 17). Non-compliance with these procedures should be acted upon immediately (Page 59 Final Report).

Section 9.0

Medical Assessment and Treatment of Potentially Exposed Individuals

The Panel is aware of a number of residents who live close to the landfill who have health problems and who attribute these problems to landfill exposures. These persons need to have access, if they don't already, to medical care to diagnose and treat their medical conditions. The Regional Public Health Department offered to assist physicians, if requested by residents, but received few requests.[75] There are environmental health protocols to follow to identify all possible sources of exposure and standard testing procedures. However, the Panel recognizes that identification of cause of conditions is very difficult to do on both individual and population basis.

The community should feel confident that any resident with health concerns will be appropriately assessed and managed by the health care system. This could be facilitated by the health representative on the CLC or the health sub-committee. The Panel does not recommend medical assessment of residents who are not suffering from health concerns beyond what is recommended by their own physician as part of a periodic health exam, unless it is a component of a future population health assessment or research study. Attempting to find health problems in persons who are not ill can itself do harm.

[75] William Hunter meeting with panel.

Section 10.0

Conclusion

There are health concerns expressed by some of the residents in the neighbourhood surrounding the Taro Landfills. These concerns have not been systematically documented nor investigated. Some residents are understandably worried, distrustful and frustrated by the confusing information they hear. Although health issues were investigated in the Environmental Assessment process and from time to time have been discussed by the CLC, a venue for accessing ongoing health expertise has not been present.

Information reviewed by the Panel on the design and construction of the East Landfill and environmental contaminants emanating from it indicates low risk of escape and low levels of exposures.[76] Accepted methods of quantitative risk assessment using this information have predicted no long-term health effects but short term respiratory effects are possible, particularly in children. Although extensive monitoring has been done, a revised monitoring schedule is recommended to ensure all contaminants of interest are monitored and the monitoring information is effectively communicated to the community.

Health effects can be associated with (but not necessarily directly caused by) living beside a landfill. The CLC has requested a health study that would provide direct health assessment. Taro has stated in their ten point plan that they would support a health study. The regional health unit also indicated that a health study should be done. Strategies to protect health in residents living close to landfills are available. The Taro Landfills have included many of these strategies. Additional strategies are recommended.

The Panel recommends establishing a health sub-committee of the CLC and undertaking a health studies program. Schedule "I" provides a starting place for consultation on health issues, and the Panel recommends that it be considered a formal component of the CofA The Panel also recommends additional monitoring, further measures to ensure continued revision of the monitoring programme, full representation from health stakeholders on a CLC sub committee, and follow-up of health issues as they arise.

The health recommendations provided here can not guarantee safety nor attribute specific cause, but can provide more confidence in the boundaries of uncertainty and reassurance of greater health understanding and protection.

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[76] The Panel was not able to assess exposure data from the West Landfill operation, the West quarry, or the asphalt plant.

Appendix A

History of Health Assessment Around the Taro East Landfill

The Company contracted with CanTox who completed a baseline risk assessment in 1995 (Appendix 7 of this report). CanTox worked with the EA study group to do the assessment. The Study Group consisted of eleven persons, seven volunteer residents of the local community, the Operations Manager for the City of Stoney Creek, the Supervisor of Solid Waste Operations for the Region of Hamilton-Wentworth, the General Manager of Taro, and the Environmental Assessment Coordinator of Philip Environmental. The Study Group met generally once a month for two and a half years in public sessions and made important decisions about the assessment. Staff of the Ministry of Environment and Energy regularly attended as resource persons.[77] Environmental impact assessments are done prior to approval of any new project that could harm the environment. The health component of environmental assessment attempts to predict, using mathematical modeling and toxicological/epidemiological evidence where available, the probability of health effects from exposures assumed will be released from the planned site. There is much discussion in the literature about the need to expand beyond traditional health risk assessment in environmental assessment to include new tools.[78] Health Canada has developed a set of draft guidelines to enhance the role of health assessment in the EA process. Davies and Sadler 1997 present a table of different methods for assessing health effects with their strengths and weaknesses, that includes risk assessment as well as surveys and mapping.[79]

Drs. Guidotti, Walker and Menzies reviewed the 1995 CanTox report on request by the Company (Appendix 7). Globaltox (Appendix 7) reviewed the CanTox 1995 report on request by the EA study group. The Regional Health Unit reviewed the 1995 CanTox report as part of the Region's response to the EA. The Chair of CLC provided the panel with a confidential internal Region report of June 1995. The HRCA summarized the Regional Health Unit's comments and concerns (in an appendix to its report that was a public document) as follows:

> -a modified health study of the residents living in close proximity to the West Quarry should be conducted as part of the Community Health Assessment
>
> -the psychosocial impacts of the landfill should be investigated

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[77] Letter to the Minister of Environment and Energy from Taro submitting the EA January 26, 1995.

[78] "There is also a need for different types of indicators to measure process, impact, and effectiveness and for new tools (stories, photography) to account for context and values" from J. Eyles, "Health, Environmental Assessments and Population Health: Tools for a Complex Process," *CJPH*, S1 S31-S34, 1999.

[79] Davies and Sadler, 1997, pp. 30-31.

> -the report does not fully address PM_{10} levels—a plan for PM_{10} levels should be provided as well as a future monitoring mechanism to ensure that PM_{10} levels are not impacted by the operation of the landfill
>
> -groundwater contamination impacts on animal life and the infiltration of contaminated groundwater into deteriorating cisterns should be addressed
>
> -the Health Impact study does not address changes in the nature of the waste streams or the landfilling rates
>
> -there should be provision to ensure chemical analysis of the new incoming waste – should the waste differ significantly from the nature of the waste predicted in the health study, then there should be a provision to ensure a new study is conducted and operations temporarily suspended
>
> - the health studies appear to have concentrated on individual health concerns but have not made any attempt to assess the cumulative impact of potential health effects identified. [80]

The concerns of the Medical Officer of Health (MOH) had been discussed with the EA Study Group[81] and the proposed ongoing monitoring protocol apparently resolved these concerns. The lawyer representing the Study Group (Harry Dahme) made specific recommendations to the Minister regarding ongoing health assessment.[82] The Terms of Reference of Dahme's recommendations indicate three levels of response and activity with explicit criteria for moving from one level to another (Schedule "I" Appendix 2).

In compliance with this EA Schedule, CanTox has continued to review the environmental monitoring information and revise its risk assessment using 1997 information in its 1998 report and 1998 information in its 1999 report (Appendix 7):

> The ongoing requirements of the current Certificate of Approval for operation of the Taro East Landfill include a rigorous analysis and interpretation of monitoring data. The objective of this review process is to continue to assure the landfill operators and the local community that the landfill represents an insignificant and non-measurable potential impact to human and environmental health. This evaluation of the data involves several important activities, including:
>
> (i) A comparison of the results of the chemical analyses from the monitoring program against assumptions made in the Community Health Assessment Study;
>
> (ii) An assessment of new chemicals identified for potential health risks, and the reassessment of chemicals detected at

---

[80] Hamilton Regional Conservation Authority (HRCA), p. 47.

[81] Panel meeting with William Hunter.

[82] Schedule "I," Dahme letter May 9, 1996 Note: The Terms of Reference are set out in a Schedule labeled "I," which might indicate that they were to be included in the Certificate of Approval which currently has Schedules A-H. The Company has assumed that the Schedule was a component of the EA and has followed it in that context.

concentrations higher, or lower than those considered in the original Health Assessment Study; and

(iii) A review of recent toxicological literature for changes to the exposure limits applied to chemicals described in the Health Assessment Study, and to identify exposure limits for new chemicals of concern.[83]

Ongoing health assessment once a project has been approved is a newer field. Health Canada[84] is investigating recommendations for prospective data collection for monitoring purposes.[85]

In 1998, with funds provided by Taro, the CLC hired an independent agency (International Institute of Concern for Public Health (IICPH) - Dr. R. Bertell and Mr. R. Dixon) to comment on the 1995 CanTox report.[86] Their review prompted a meeting held between CanTox and Bertell/Dixon,[87] a response from CanTox to the review and a letter as well as unpublished response from Mr. Dixon.[88] The CLC planned to request additional comments on the Bertell/Dixon review.[89] They did receive a response from the Regional Health Unit[90] (Appendix 7). The CLC Chair noted in his brief to the panel that the MOE "has never responded to the IICPH review."[91] It does appear that there was no sufficient opportunity for the CLC to discuss the different perspectives of CanTox and IICPH. The Panel experienced these different perspectives and acknowledges that there are areas of disagreement but did find areas of common interest and some agreement.

From September 1998 to the present, the CLC minutes do not further document any discussion about the Bertell/Dixon report but do refer to a "Health Study"[92] (Appendix 3).

In 1999, Colin Isaacs approached the Company to undertake a review of the CLC and the public concerns about the landfill[93] and the Company retained Mr. Isaacs and agreed to fund this project. Mr. Isaacs reported in July 1999[94] significant evidence of general health concerns[95] and included a number of recommendations to improve communication including adding a representative with health expertise to the CLC.[96] Although the Isaacs

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[83] p. 1. CanTox Report, June 2000.
[84] http://www.hc-sc.gc.ca/ehp/ehd/ocha/tech_report.htm.
[85] Canadian Handbook on Health Impact Assessment DRAFT Volume 3, Chapter D, p. D17.
[86] Schedule "I" is not mentioned in this review.
[87] CLC Minutes, June 3, 1998.
[88] A problem with the CLC process apparently occurred as a result of Taro's experts criticizing the expertise of the CLC's consultant (Dr Bertell) during the meeting between CanTox and Bertell/Dixon. This created a "helpless" feeling that any input from any CLC appointed experts could be negated by the "over-powering" Taro experts (personal communication Carmen D'Angelo).
[89] CLC Minutes, September 15, 1998.
[90] Dated July 30, 1998.
[91] Memo, May 15, 2000, p. 5.
[92] CLC Minutes, 1999.
[93] 1999 Annual report Section M-8 letter to Hardy Wong. And CLC Minutes, February 3, 1999.
[94] 1999 Annual report, p. 54.
[95] Isaacs report p. 3 (Of 111 residents surveyed, 2 % were extremely concerned, 60% very concerned, 29 % somewhat concerned about the effects of the landfill on the environment or public health).
[96] Issacs report, p. 12.

report was reportedly presented to the CLC,[97] there are apparently no minutes from a meeting in June 1999.

Carmen D'Angelo, Chair of the CLC, presented the Expert Panel with a commentary and set of questions, some of which include health concerns (Appendix J Final Report).

[97] 1999 Annual Report.

Appendix B

Schedule "I"

May 9, 1996 Letter to Minister Elliott from Harry J. Dahme, Lawyer representing study group re Terms of Reference for health study under EAA. (to be inserted)

GOWLINGS

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Commerce Court West
Toronto, Ontario
Canada M5L 1J3
Telephone (416) 862-7525
Facsimile (416) 862-7661

Harry J. Dahme
Direct: (416) 862-4300
Secretary: (416) 862-4355
dahmeH@gowlings.com
File T794058

May 9, 1996

The Honourable Brenda Elliott
Minister of Environment and Energy
12th Floor
135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5

COPY

Dear Madam Minister:

Re: TARO AGGREGATES LTD. - PROPOSED EAST QUARRY LANDFILL ENVIRONMENTAL ASSESSMENT
EA File No. PR-TA-02

I have previously written to you in respect of the above-mentioned matter on October 11, 1995 and March 5, 1996. As you know, I act for the community members of the Taro East Quarry Study Group and have been negotiating on their behalf with Taro regarding Conditions to be attached to a Certificate of Approval, if granted, and for the purpose of arriving at a Compensation Agreement.

In my first letter to you of October 11, 1995 I advised you that the community members of the Taro East Quarry Study Group had reached the following conclusions:

(1) With respect to the technical aspects of Taro's proposal, the community members of the Study Group agreed with the conclusions of the peer reviewers retained by the Study Group. The peer reviewers had concluded that the project was acceptable subject to the successful conclusion of negotiations on Terms and Conditions and on the Compensation Agreement;

(2) With respect to the Environmental Assessment aspect of Taro's proposal, a majority of the community members of the Study Group supported acceptance and approval of the proposal subject to strict compliance with Terms and Conditions.

I wrote to you again on March 5, 1996 and confirmed the position of the community members of the Study Group and at the same time I requested that a specific condition of approval be attached to the *Environmental Assessment Act* approval requiring compliance by Taro with the key elements of the Compensation Agreement, a copy of which was included.

I have reviewed the Notice of Acceptance dated April 22, 1996 and the attached proposed draft Terms and Conditions of *Environmental Assessment Act* approval. I very much appreciate the inclusion of Condition 6.1 as providing a requirement for continued negotiations in respect of the Compensation Agreement.

Negotiations with Taro on the Compensation Agreement are in the very last stages and at this point are only subject to minor amendments to the precise wording. There is no dispute, as far as I am aware, as to the broad terms of that Agreement and, accordingly, I request that section 6.1 be amended to reflect the broad terms of the Agreement between the Study Group and Taro. For your convenience, a suggested Condition is set out below:

> 6.1 Should the Minister or the Board "approve the undertaking" Taro shall be obligated to comply with the terms of a Compensation Agreement which provides for the following:
>
> (i) annual payments of $5,000.00 to property owners identified in an agreed upon Schedule to the Compensation Agreement;
>
> (ii) annual payments of $2,500.00 to tenants of properties listed in the above-mentioned Schedule;
>
> (iii) a property value protection plan applicable to the properties listed in the above-mentioned Schedule;
>
> (iv) an agreed upon procedure to compensate owners and occupiers of property within an agreed upon distance for nuisance caused as a result of construction and/or operation or the proposed landfill, up to a maximum of $25,000.00 per owner/occupier per year;
>
> (v) annual royalty payments calculated on a fee per tonne in accordance with the following table, and payable to a Community Trust Fund to be established according to agreed upon terms:

Tipping Fee	Royalty
$0 - 35	$1.00
$35.01 - $40	$1.50
$10.01 - $50	$2.00
$50.01 - $60	$3.00

Further, I request that a term and condition of approval be added with requires Taro to undertake a long term study of sources of potential health impacts and to develop a health impact prevention programme in accordance with the Terms of Reference set out in the attached document.

We have determined in consultation with MOEE, the City of Stoney Creek and Taro that it would be appropriate that those Terms of Reference be provided for in the EAA approval rather than the EPA approval as originally discussed between the parties, hence my request that this now be included as a condition under *Environmental Assessment Act* approval.

Last, I indicated at the outset of this letter that the community members of the Study Group had determined that Taro's proposal was acceptable subject to the successful conclusion of negotiations on Terms and Conditions. This is to advise that those negotiations have almost been completed. Meetings have been held between Taro, the City of Stoney Creek, the community members of the Study Group and MOEE. The great majority of Terms and Conditions have been agreed upon. It is my opinion that these Terms and Conditions as already agreed upon are exemplary and support the position of the community members of the Study Group that this proposed landfill site can and will be developed and operated in environmentally safe and sound fashion.

We appreciate the opportunity to provide you with our comments on the Notice of Acceptance and the attached proposed draft Terms and Conditions. We trust that you will give our submission your very careful consideration.

Yours very truly

GOWLING, STRATHY & HENDERSON

Harry J. Dahme

HJD:dm
Enclosure
c.c. Mr. J. Fisher
Mr. H. Turkstra
Mr. T. Richardson
All members of the Study Group

g:\cl\ev\taro\ell03hjd.ltr
Apr 29/96 3:39pm

SCHEDULE "I"

TERMS OF REFERENCE FOR LONG TERM STUDY OF SOURCES OF POTENTIAL HEALTH IMPACTS AND HEALTH IMPACT PREVENTION PROGRAMME

1.0 The Community Health Impact Prevention Programme (the "Programme) to be initiated and conducted by the Company in consultation with the CLC and the Medical Officer of Health of the Regional Municipality of Hamilton-Wentworth ("MOH") shall consider three discharges. The discharges that shall be considered are:

(i) leachate;

(ii) landfill gases; and

(iii) dust.

1.1 The Community Health Assessment Review required to be conducted in accordance with the provisions set out below shall be conducted by a qualified and experienced individual trained in the conducting of a health risk assessment and shall be approved by the Director.

2.0 The Programme shall consist of three levels of response and activity. The information gathering and analysis, communications and reporting protocols and triggering mechanisms which cause a shift from one level to the next are set out below.

2.1.1 Level 1:

Monitoring programmes by the Companny shall be as follows:

(i) leachate, in accordance with Schedules "C" and "F";

(ii) landfill gases, in accordance with Schedule "E"; and

(iii) dust, in accordance with Schedule "G".

2.1.2 The analytical results of the monitoring programmes shall be compared to the assumptions used in the Community Health Assessment Study, January, 1995, Item 16, Schedule "A".

2.1.3 If none of the analytical results from the samples taken during the monitoring programmes exceed the assumptions used in the Community Health Assessment Study, then the monitoring programmes shall be maintained as

indicated above and the results shall be documented and reported to the MOH, the CLC and the City.

2.1.4 (a) If any one of the analytical results of the samples taken during the monitoring programmes exceed the concentrations assumed for the purposes of the Community Health Assessment Study, or if the monitoring identifies a chemical not considered in the Community Health Assessment Study, then a detailed Review of the Community Health Assessment Study will be conducted by the consultant referred to in clause 1.1.

(b) The detailed Review of the Community Health Assessment Study shall be conducted in consultation with the MOH, the CLC and the City.

(c) If the Health Assessment Review determines that there is no increase in health risk to the Community, then the monitoring programme shall remain as in Level 1;

(d) If the results of the detailed Health Assessment Review predict an increase in the risk to community health then the programme would shift to Level 2.

2.2 Level 2:

2.2.1 The monitoring programme set out with respect to Level 1 shall be reviewed in consultation with the MOH, the CLC and the City and shall be augmented in accordance with the instructions of the Director.

2.2.2 The Company shall identify appropriate exposure monitoring, in consultation with the MOH, the CLC and the City and shall conduct such monitoring in accordance with the instructions of the Director. The exposure monitoring shall be performed at or near the Landfill Site property boundary at the specific locations and frequency identified in the programme.

2.2.3 The analytical results from the Level 2 monitoring, including exposure monitoring, shall be used to conduct a Community Health Assessment Review.

2.2.4 If the results of the Review are, based on the exposure data, that no health impacts are predicted, then the monitoring programme shall remain in Level 2 for a period of two years following which, if there is no increase above Level 1 criteria, then the programme may revert to monitoring as per Level 1.

2.2.5 If the results of the Community Health Assessment Review predict an increase in risk, then the programme will proceed to Level 3.

2.3 Level 3:

2.3.1 The Company, in consultation with the MOH, the CLC and the City, shall identify and implement mitigation measures designed to reduce health risk to the Community.

2.3.2 The Company shall pay for an independent review of the proposed mitigation measures to be conducted by qualified consultants to be retained by the CLC.

2.3.3 The Company shall, following consultation with the MOH, the CLC and the City, develop a public communications and participation program in order to inform the Community about:

(a) the monitoring results;

(b) the results of the Health Risk Assessment Review;

(c) the status of the program to develop and implement mitigation strategies.

2.3.4 Monitoring shall be conducted by the Company in accordance with the Level 2 recommendations, augmented as necessary, following consultation with the MOH, the CLC and the City.

2.3.5 The monitoring data which is obtained shall be reviewed by the consultant referred to in clause 1.1. on a semi-annual basis and shall be used on semi-annual basis for the purposes of conducting a Community Health Assessment Review.

2.3.6 The results of the Community Health Assessment Review shall be reported by the Company to the Community annually.

2.3.7 If the semi-annual results of the Level 3 monitoring confirm that the mitigation measures implemented have reduced discharges to a level equal to or less than the assumptions used in the Community Health Assessment Review, then following two years of monitoring, monitoring by the Company shall return to Level 1.

2.3.8 If the semi-annual results of the monitoring programme and the Community Health Assessment Review demonstrate a continued increased risk to community health then the entire Level 3 programme will be repeated by the Company.

bcc: Correspondence Centre
J. Wright, C & P Division
H. Wong, WC Region
C. Pautler
EA File No. PR-TA-02

Author: J. Bullen/fs
WP140\0186H
W.O. #: 53174

Mr. Harry Dahme
Gowling, Strathy & Henderson
Barristers and Solicitors
Suite 4900
Commerce Court West
Toronto, Ontario
M5L 1J3

Dear Mr. Dahme:

Thank you for your letter, dated March 5, 1996, concerning Taro Aggregates proposed East Quarry Landfill Environmental Assessment. I apologize for the delay in responding to your inquiry.

Concerning your request, should approval for the proposed undertaking be granted in the absence of a hearing, the ministry will include the provisions of the Compensation Agreement as a condition of 'approval'. Should your assistance be required, staff will contact you directly.

Once again, thank you for your letter on behalf of the East Quarry Study Group.

Yours sincerely.

Original signed by Minister

JUN - 3 1996

Brenda Elliott
Minister

Minister
Ministre

Ministry of Environment and Energy
Ministère de l'Environnement et de l'Énergie

135 St. Clair Avenue West
Toronto ON M4V 1P5

135, avenue St. Clair ouest
Toronto ON M4V 1P5

S4850

July 19, 1996

REGISTERED MAIL

Mr. John Fisher
General Manager
Taro Aggregates Ltd.
65 Green Mountain Road
Stoney Creek, Ontario
L8J 1X5

Dear Mr. Fisher:

With regard to the proposed East Quarry Landfill Environmental Assessment, attached please find a signed copy of the Notice of Approval to Proceed with the Undertaking which was approved on July 17, 1996 by Order-in-Council No. 1422/96 (also attached), as required by the *Environmental Assessment Act*.

Yours sincerely,

Brenda Elliott
Minister

Enclosure

cc: Mr. Dominic Agostino, M.P.P.
Hamilton East

Mr. Trevor Pettit, M.P.P.
Hamilton Mountain

Mr. Ed Doyle, M.P.P.
Wentworth East

ENVIRONMENTAL ASSESSMENT ACT

SECTION 14

NOTICE OF APPROVAL TO PROCEED WITH THE UNDERTAKING

RE: An Environmental Assessment for the East Quarry Landfill Site in the City of Stoney Creek in The Regional Municipality of Hamilton-Wentworth

Proponent: Taro Aggregates Ltd.

EA File No.: PR-TA-02

TAKE NOTICE that the period for requiring a hearing, provided for in the Notice of Acceptance of the Environmental Assessment for the undertaking, expired on May 17, 1996.

Having considered the purpose of the Act, the Environmental Assessment of the undertaking as accepted and the submissions received, I determine that a hearing is unnecessary and I hereby give approval to proceed with the undertaking subject to the attached terms and conditions.

REASONS:

My reasons for determining that a hearing is unnecessary and for giving approval are:

1. The Ministry of the Environment and Energy's Technical Review Team has concluded that the proposed East Quarry Landfill Site can be approved, and that the environment can be adequately protected through terms and conditions.

2. Two independent peer reviews concluded that the landfill site can be constructed and operated subject to terms and conditions. The City's consultant concluded that 'it is possible to construct and operate a landfill site in the

East Quarry in an environmentally acceptable manner provided that the site is subject to terms and conditions to ensure environmental safety'. The peer review team of Taro's Study Group found that the site can be developed and operated in an environmentally safe and sound fashion subject to terms and conditions.

3. The matters identified by the majority of the Government Review Team can be addressed through terms and conditions attached to the approval.

4. The Regional Municipality is not opposed to the application, subject to certain conditions.

5. The Regional Health Department, with support from McMaster University, is of the opinion that there would be no significant health impacts from operation of the East Quarry Landfill Site.

6. Many of the concerns noted by members of the public will be addressed through terms and conditions of approval under the *Environmental Assessment Act* and *Environmental Protection Act*.

7. The Study Group which was involved from the beginning of the project is of the view that the project can proceed subject to terms and conditions.

8. While the Council of the local municipality does not support the project, there are no overriding environmental issues which can not be adequately addressed through terms and conditions.

Dated the 15 day of July, 1996 at TORONTO.

Minister of Environment and Energy
135 St. Clair Avenue West
12th Floor
Toronto, Ontario
M4V 1P5

Approved by O.C. No. 1422-96

Terms and Conditions

East Quarry Landfill Site
under the
Environmental Assessment Act

O.C. / Décret 1422/96

1.0 Definitions

For the purpose of these Terms and Conditions:

1.1 "Proponent" means Taro Aggregates Ltd. and includes its administrators, successors and assigns.

1.2 "Site" refers to the East Quarry Landfill Site.

1.3 "MOEE" refers to the Ministry of Environment and Energy.

1.4 "CLC" refers to the Community Liaison Committee.

The following conditions apply to the East Quarry Landfill Site, unless otherwise specified.

2.0 General Requirements

2.1 The proponent shall comply with all of the provisions of the Environmental Assessment as accepted by the Minister of Environment and Energy which are incorporated herein by reference except as provided in these conditions and as provided in any Part V *Environmental Protection Act* Provisional Certificate of Approval for the site.

2.2 Where a document is required for the public record, it shall be provided to the Director of the Environmental Assessment Branch for filing with the public record file maintained for the undertaking. Additional copies of all such documents will be provided by the proponent for public access to:

- the Regional Director of the MOEE;
- the offices of The Corporation of the City of Stoney Creek and The Regional Municipality of Hamilton-Wentworth;
- at least one local library; and
- to the Community Liaison Committee.

2.3 All financial liabilities and other responsibilities that are associated with the design, development, operation, closure, monitoring, leachate and gas collection, and remedial measures related to the site are binding on the proponent. Remedial measures include the restoration of water supplies affected by the proponent's landfill operations.

2.4 Yearly Report

Each year, until the fifth year after the completion of closing of the site, the proponent shall issue a yearly report which describes compliance with these and any other conditions of approval. A copy of each report will be forwarded to:

- the Public Record of the Environmental Assessment Branch, and;
- the Medical Officer of Health for The Regional Municipality of Hamilton-Wentworth.

The Regional Director of the MOEE shall review the report. This report can also address any condition of approval to prepare an 'yearly report' under the *Environmental Protection Act.*

2.4.1 The proponent shall publish notice of the availability of the yearly report in local newspapers designated from time to time by the CLC.

3.0 Technical Requirements

3.1 *3R's Technologies*

Every five years after the site becomes operational, the proponent shall assess the waste residues received from Philips and waste received from other sources to determine whether any 3R's technologies could be used economically to further divert the residues from landfill. The proponent will present the findings of the assessment to the CLC.

3.2 *Aggregates Resources Act*

The proponent will apply to the Ministry of Natural Resources to amend the East Quarry's site plan under the provisions of the *Aggregates Resources Act.*

3.3 *Highway Improvements*

The proponent will consult with the Ministry of Transportation on matters pertaining to intersection improvements at Highway 20 and Green Mountain Road, access improvement to the East Quarry from

Highway 20, and drainage management regarding the East Quarry and the Highway 20 right-of-way and obtain any necessary permits and approvals.

3.4 *Landscaping Plan*

The proponent, in consultation with the CLC, shall develop a landscaping plan for the East Quarry landfill site to be submitted to the MOEE West Central Regional Director for review and approval within 6 months of receiving approval under the *Environmental Assessment Act*. The landscaping plan shall take all reasonable measures to ensure that visual impact resulting from the operation of the site is minimized. The proponent shall commence implementation of the landscaping plan no later than the next landscaping season following approval of the plan by the MOEE West Central Regional Director.

4.0 **The Wentworth County Board of Education**

The proponent will make every effort to ensure that the existing or pre-landfill level of safety for school buses will be maintained through the operational life of the landfill. Any decrease in the present level of safety, due directly to operational activities associated with the East Quarry Landfill, will be responsibility of Taro to mitigate and/or eliminate to the satisfaction of The Wentworth County Board of Education.

Taro shall consult with The Wentworth County Board of Education on the proposed truck traffic routes for the East Quarry Landfill and mutually assess whether further study is required to investigate the safety of school bus traffic. Any additional costs associated with Taro incurred by The Wentworth County Board of Education shall be the sole responsibility of the proponent, which shall reimburse the Board for any costs not borne directly by the proponent.

5.0 **The Corporation of the City of Stoney Creek (the "City")**

5.1 Before the East Quarry becomes operational, the proponent shall complete its Community Impact Management Program, including an Agreement with the City and the Study Group with respect to compensation to the municipality.

If the parties are unable to successfully negotiate a Community Impact Management Program, then the program shall be the subject of mediation through the facilities of the Environmental Assessment Board.

5.2 Taro shall fund the preparation of a detailed secondary plan to be prepared by the City for the lands designated as "Special Policy Area B" in the City of Stoney Creek Official Plan. The secondary plan shall specify the approximate mix, timing of development, etc. in the context of the proposed East Quarry Landfill.

A Steering Committee shall be established to oversee the preparation of the Secondary Plan. This steering committee shall be comprised of representatives of the City, Taro and any other land owners within Special Policy Area "B". The City shall retain consultants to participate in the preparation of the Secondary Plan who are acceptable to both the City and Taro.

5.3 The proponent will enter into a Site Plan Agreement with the City, which will include provisions for landscaping the East Quarry Landfill site.

5.4 The proponent shall continue to work with the City and the Study Group to resolve all outstanding technical matters in respect of the Part V *Environmental Protection Act* provisional Certificate of Approval for the site.

Any matter with respect to the Part V *Environmental Protection Act* provisional Certificate of Approval which cannot be resolved by negotiation may be referred to mediation by either the proponent, the Study Group or the city. Such mediation shall be conducted by one or more members of the Environmental Assessment Board. The parties to the mediation shall be the proponent, the City, the Ministry of the Environment and Energy and the study Group, being the parties which have participated in the negotiation on the technical matters referred to above. The final decisions on the terms and conditions will be made by the Director issuing the approval.

5.5 Financial Assurance

Taro shall prepare a financial assurance package in accordance with Ministry of Environment and Energy guide entitled "Financial Assurance (Part XII - Ontario Environmental Protection Act) A Guide", May 1996. The financial assurance package shall be submitted as part of the *Environmental Protection Act* approval documentation and be reviewed and accepted by the Director prior to issuance of a Certificate of Approval under Part V of the *Environmental Protection Act*.

The City shall have the right to review and comment on the financial assurance package.

5.6 Hydrogeologic Modelling

Taro shall document the modelling conducted according to standard modelling documentation requirements. The documentation should contain sufficient information and allow third party review of all aspects. The assessment documentation shall be submitted as part of the *Environmental Protection Act* approval documentation, and be reviewed and accepted by the Director prior to issuance of a Certificate of Approval under the *Environmental Protection Act*.

The City shall have the right to review and comment on the modelling documentation.

5.7 West Quarry Remedial Works

Taro shall assess and document the West Quarry remedial works. This documentation shall be submitted, along with any updates in support of the *Environmental Protection Act* approval documentation for the East Quarry Landfill Site. The Provisional Certificate of Approval for the East Quarry Landfill Site shall not be issued until the remedial works for the West Quarry Landfill Site have been approved by the Director, as part of the Provisional Certificate of Approval for the West Quarry Landfill Site.

The City shall have the right to review and comment on the West Quarry remedial works documentation.

The "yearly report" submitted under condition 2.4 shall include a review of the performance of the West Quarry remedial works and

any changes that have been made or are proposed to be made in them.

5.8 Impact of Development South of the East Quarry Landfill Site on Ground Water

Taro shall conduct an assessment of the reasonable impacts on the ground water flow system as a result of development south of the landfill for the contaminating lifespan of the landfill. The assessment shall include modelling where applicable. The assessment documentation shall be submitted as part of the *Environmental Protection Act* approval documentation, and be reviewed and accepted by the Director prior to the issuance of a Certificate of Approval under the *Environmental Protection Act.*

The City shall have the right to review and comment on the ground water assessment documentation.

5.9 Long-term Impact of Dewatering

A full and complete assessment of the impacts of long-term dewatering and the impacts of ground water upwelling shall be completed. The assessment documentation shall be submitted as part of the *Environmental Protection Act* approval documentation. and be reviewed and accepted by the Director prior to issuance of a Certificate of Approval under the *Environmental Protection Act.*

The City shall have the right to review and comment on the long-term ground water assessment documentation.

5.10 Contingency Plan Development

Contingency plans outlined in the EA documentation shall be enhanced to a conceptual level that allows for design, capital and operating costs to be developed for each contingency. The contingency plan shall be included within the financial assurance package. The documentation shall be submitted as part of the *Environmental Protection Act* approval documentation, and be reviewed and accepted by the Director prior to issuance of a Certificate of Approval under the *Environmental Protection Act.*

The City shall have the right to review and comment on the contingency plans.

6.0 **Regional Municipality of Hamilton-Wentworth**

6.1 Taro shall attempt to negotiate a royalty to be paid to The Regional Municipality of Hamilton-Wentworth on each tonne of waste entering the East Quarry Landfill for disposal.

7.0 **Compensation Agreement**

Prior to commencing operations, the proponent shall enter into a compensation agreement reflecting the principles and amounts set out in the paragraphs numbered 6.1 in the letter of Gowlings to the Minister dated May 9, 1996, a copy of which is in the public record, and the proponent shall make payments in accordance with the agreement.

8.0 **Long Term Study of Health Impacts**

Taro shall undertake a long term study of sources of potential health impacts and develop a health impact prevention programme in accordance with the Terms of Reference set-out in the Attachment, headed Schedule I, to the letter of May 9, 1996, from Gowlings to the Minister.

Appendix C

Review of CLC Minutes Provided in Document Binder and/or by CLC Secretary January 1997 to November 1999

Jan 16, 1997

p. 4

" Kathy McLean asked if a Health Survey would be conducted. Wayne Jackman pointed out that the CofA does not require a Health Survey be conducted. The nearby population is too small for a statistically valid survey. The Environmental Assessment does require that Taro constantly revisit the Health Assessment and to check assumptions made and to confirm their continued validity. If any circumstances change, Taro would be required to react to meet all health requirements. Joyce Young suggested the issue of a Health Survey be flagged for a future discussion. Group agreed. Wayne Jackman will distribute Health monitoring requirement."

April 14, 1997

p. 6

"Kathy McLean asked that an "Unfinished Business" section be added to the minutes so as not to lose site of issues we have deferred such as the Health Survey. She asked that this be put on the May 12 agenda."

May 12, 1997

p. 9-10

(b) Health Assessment Survey
Action: Carmen to invite a consultant and a rep from the Medical Officer of Health's department.

June 9, 1997

p. 7- 10 Health Assessment Survey

Item 5. Guests: Bill Hunter (Public Health), Larry Chambers (McMaster), Bob Willis (CanTox), John Minns (representing Brian Gibson MD, University of Toronto)

Concerns re small population, not enough to establish cause.

"The discussion then got out of control…"

p. 11 "Joyce advised attendees…."

June 17, 1997

p. 10-20

Item #2 Health Study

"p. 15: "The first step would be to establish a sub-committee of the CLC inviting a variety of experts ...."

p. 20 Vote:

1. Review the health study done for the EA and the peer review, and bring any comments to the meeting? In Favour 6 Against 2
2. Go ahead with the community health profile? In Favour 2 Against 5 Abstained 1

July 14, 1997

p. 5-7

"Health study reports were briefly reviewed."
"Dave Barlow ...letter from the East Hamilton- Stoney Creek Health Association which supports a health study"
Action: Wayne to supply copies of the answers to the peer review questions.

September 8, 1997

p. 12 Health Study deferred to next meeting agenda.

October 8, 1997

p. 10 Dave Barlow to investigate Health Assessment consultants.

November 17, 1997

p. 2 Health Study deferred to next meeting.

December 11, 1997

p. 5-6 Health Study

Committee request formal proposal from the consultants. Allocate up to $5000.

January 14, 1998

Health study not mentioned in minutes.

February 25, 1998

Health study not mentioned in minutes.

April 1, 1998

p. 3 Proposal to have health study consultant come at meeting of April 22, 1998 (meeting not held).

June 3, 1998

p. 4-5 Item 6 Health Study: "Regarding the Bertell/Dixon Report there was a meeting on June 1st. Anyone familiar with results of that meeting....." Action: Consultants to be requested to provide written report of their meeting. Issue tabled until report received.

September 15, 1998

p.8 Section 2.4 Health Study: "After some discussion, consensus was reached on sending out a package of health study related information to several agencies for review. The package will contain a copy of the Bertell/Dixon review of the CanTox report, the CanTox response to the Bertell/Dixon review and the Bertell/Dixon response to the CanTox response. A cover letter will be enclosed, asking that agencies respond quickly to the request to review, and offering a copy of the original CanTox report if needed. C.D'Angelo will draft the cover letter."

October 20, 1998

Health study not mentioned in minutes.

November 3, 1998

p. 10 : Brad Clark read from a report "Landfills are dangerous,"
women living near solid waste landfill .....bladder cancer, leukemia.

Feb 3, 1999

p. 7 Regarding the U. family:.... Levels of cadmium in dust 243% higher.

September 29, 1999

(Following MOE 6-point plan)
Item 7: "DB indicated that at the December 1996 meeting the CLC asked the company for a health study and it has taken until now for the company to finally agree. He is glad this is finally happening."

October 20, 1999

Not mentioned in minutes.

November 17, 1999

p. 3 # 9 Health Study – Go to the people who are being affected primarily.

Appendix D

Annual (1999) Progress Report for Toxic Substance Research Initiative (TSRI) Grant 233 (Excerpts)

Project Title: Air Pollution, Environmental Equity and Health: A Spatiotemporal Analysis

Michael Jerrett, PhD
Principal Investigator
Assistant Professor, School of Geography and Geology
and McMaster Institute of Environment and Health

Rick Burnett, PhD
Co-investigator
Health Protection Branch, Health Canada

Pavlos Kanaroglou, PhD
Co-investigator
Professor, School of Geography and Geology
And McMaster Institute of Environment and Health

Jeff Brook, PhD
Co-investigator
Atmospheric Environment Service, Environment Canada

December 24, 1999

PROJECT SUMMARY

This research uses Geographic Information Systems (GIS) to integrate and advance past work on environmental equity and the health effects of urban air pollution. GIS makes it possible to assess the spatial dimensions of pollution accurately within a region, thus enabling us to derive relatively precise exposure estimates for general and vulnerable populations. In this study, we combine traditional time series methods with new spatial-analytic techniques to improve exposure estimates and conduct health-equity analyses to determine which groups suffer from air pollution. Our analysis relies on 15 years of mortality and pollution data from Hamilton-Wentworth (i.e., 1980-94). Our emphasis on time-space interactions and vulnerable population groups will make a unique and policy-relevant contribution to the growing debate on whether and by how much governments should strengthen air pollution control policies in an urban context. The research meets the following needs identified in the TSRI priority area of urban air pollution: (1) improved exposure estimates through the interpolation of pollution data from monitoring

sites within Hamilton-Wentworth; (2) greater understanding of the confounding effect of co-pollutants (i.e., particulate and gaseous air pollution) within the Region; (3) better assessment of exposure for vulnerable population groups such as children, the elderly, and the socioeconomically disadvantaged; and (4) increased knowledge on the dose-response relationship in vulnerable and average population groups to determine the health risks for these groups.

Greater understanding of the air pollution-health link may also help to educate the public about this important health issue, and in so doing, this research may empower policymakers to take action with a broader base of public support. In addition, the GIS data base and an associated World Wide Web page, capable of serving environmental and health data in map formats, will act as a significant resource for researchers, the public, and policymakers. The data base and Web page will serve as a prototype for regional health information systems in other metropolitan areas. An existing Memorandum of Understanding (March 1998) between the McMaster Institute of Environment and Health and Health Canada will facilitate collaboration among the researchers. The Institute is assisting with project administration and rapid communication of the results via the World Wide Web and scholarly journals. Through the collaboration, Health Canada and Environment Canada gain expertise in GIS and spatial modelling, while McMaster gains experience with advanced time series methods and air pollution modelling. Finally, students and a postdoctoral fellow will receive excellent training in all of these areas.

KEY HYPOTHESES AND OBJECTIVES

The approved research will promote greater understanding of environmental equity and the health effects of air pollution by testing **five related hypotheses**:

- Particulate and gaseous air pollution in Hamilton-Wentworth will show significant intra-regional variation.
- Intra-regional variation in pollution levels will result in significantly different spatiotemporal doses for different population groups located in different zones of the Region.
- Exposure to different doses of particulate and gaseous air pollution within the Region will associate with different levels of population mortality, and this relationship will, other factors being equal, exhibit a consistent dose-response relationship (i.e., higher pollution zones will associate higher mortality rates).
- Low socioeconomic status groups are more likely to be exposed to high levels of particulate and gaseous air pollution (i.e., these groups will receive higher doses).
- Vulnerable groups such as children, the elderly, and those of low socioeconomic status will experience larger dose-response health effects from exposure to elevated air pollution levels than less vulnerable or higher status groups. In other words, there will be interactive heterogeneity or effect modification in the health response to particulate and gaseous air pollution.

Six objectives flow from these hypotheses: (1) to assess the spatial distribution of particulate and gaseous air pollution in Hamilton-Wentworth; (2) to assess the distribution of air pollution among vulnerable population groups; (3) to utilize mortality data to test for significant spatial and temporal associations with high pollution levels; (4) to combine health, pollution, socioeconomic, and lifestyle data into an ecological statistical model that tests for the independent health and interactive health effects of air pollution, while controlling for other known determinants of health; (5) to develop the first time-space covariance model for assessing spatiotemporal associations between air pollution and mortality; and (6) to develop a GIS World Wide Web (WWW) server capable of delivering environmental, socioeconomic, and health data to medical researchers, policymakers, and the public.

Appendix E

Spatial Analysis in a GIS Environment: Approaches and Methods

M. Jerrett

The spatial analysis of disease advanced for many years without the aid of geographic information systems (GIS) and associated spatial statistics, but the advent of these tools and methods has expanded the use of spatial analysis in environmental and public health. GIS is generally seen as a spatial analysis system for the organization, storage, transformation, retrieval, analysis, and display of data for which the location of attributes is considered important (e.g., the incidence of a specific disease condition in relation to a pollution source). Illustrative examples from the recently published Epidemiology Reanalysis Project and ongoing research on links between air pollution and disease in Hamilton are given to help readers understand the strengths and weaknesses of each type of spatial analysis.

Spatial analysis typically employs two types of information. The first type includes attributes of spatial features measured in interval or ratio variables such as population size, mortality rates, pollution estimates or ordinal and nominal variables such as disease severity, name, or soil type. The second type of information involves the location of a spatial feature described by position on a map measured in one of many geographic coordinate or referencing system.

In bringing these two types of information together, spatial analysis seeks to assess non-independence or association in attribute values at the same or nearby locations or locations likely to experience spatial interaction (e.g., airports with connections to other distant airports). Explicit and systematic treatment of the locational aspects of attribute values separates spatial analysis from the standard statistical analysis employed in most environmental and public health research.

Spatial analysis in a GIS environment can be divided into three broad categories: (1) visualization, (2) exploration, and (3) modeling (Bailey and Gatrell 1995). For example, spatially continuous air pollution data measured at fixed-site monitors first have to be interpolated with a statistical model before pollution distributions can be visualized. Yet these categories remain useful for explaining the various approaches employed by medical geographers and spatial epidemiologists. Bailey and Gatrell (1995) refer to "interactive spatial data analysis" to suggest that in a computing environment many hypotheses can be tested interactively on screen, thus yielding unforseen or previously unimagined results. These formulae are presented elsewhere.

Visualization involves linking attribute data such as mortality rates, pollution estimates, or covariate data such as educational level to locations measured in a coordinate system such as longitude and latitude. Maps produced by linking attributes to coordinate systems help to generate hypotheses about potential relationships between environmental phenomena and health outcomes. Visualizing some aspect of the effect (e.g., mortality)

gives clues about possible causes of disease. By visualizing and reclassifying attribute data, analysts can screen variables for more sophisticated modeling.

Exploration builds on visualization with spatial "queries" based on Boolean or set operators that may show co-location, for example, between areas of high pollution and high mortality rates. Such queries will highlight areas on the map that meet both conditions.

Modeling combines both visualization and exploration techniques with statistical analysis designed to assess whether spatial patterns apparent in the data have occurred by chance or whether they display significant departures from a random or control distribution. Spatial modeling usually focuses on data in the following forms: points (e.g., the location of individuals who have died in a given period), point attribute (e.g., estimates of pollution at a fixed-site monitor), areal form (e.g., a census tract polygon with an age-adjusted mortality rate), or continuous surface form (e.g., surfaces of pollution interpolated from estimates of fixed-point attributes). Point pattern maps are referred to as "dot" or "dot density" maps. Areal data maps are called "choropleth" maps. Maps displaying continuous surfaces are usually referred to as "contour," "isoline," or "isopleth" maps.

Appendix F

Health Concerns Reported to the Expert Panel

Some residents discussed their concerns with the Panel at its open meeting in June, 2000. At the open meeting Panel members heard of chronic concerns, continuous prescriptions and similar issues raised below.

Some residents concerned about air-borne fallout have a history of (Upper Respiratory Tract (URT) irritations and infections, which they fear is directly related to poor air quality from the landfill. A past medical condition of one resident was believed to be associated with elevated blood levels of aluminum.

Another family has had continued problems with migraines, and URT infections. In addition, their 4-year-old daughter was born with a neural tube birth defect.

The Panel also heard reports of cancer clusters, undiagnosed bone pains, allergic reactions, migraine headaches, severe and constant ear infections, chest infections and asthma from other key informants.

The Panel checked with local health authorities and was told that there are no documented health concerns related to the Taro operations.

Appendix G

Written Documents Reviewed

Proposed East Quarry Landfill Environmental Assessment Volumes I and II January 1995

CanTox Inc. Taro East Quarry Landfill Community Health Assessment Study plus Appendices A-D

Reviews of CanTox Community Health Assessment:

Chris Walker MD March 16, 1995 Item # 16 Documents Binder
Tee Guidotti MD August 30, 1995 Item # 17 Documents Binder
Region of Hamilton-Wentworth Confidential Report June 16, 1995
GlobalTox: February 8, 1994 from Ron Breacher to Jon Kauffman. Item # 18 Documents Binder

HRCA Appendix A September 1995, Table 1 Review Team Response p. 47 Hamilton-Wentworth Regional Health Unit (included in the reports presented to the Full Authority October 19, 1995)

May 9, 1996 Letter to Minister Elliott from Harry J. Dahme, Lawyer representing study group re Terms of Reference for health study under EAA.

"Review of Taro East Quarry Community Health Study" by Dr. Rosalie Bertell and Mr. Roger Dixon, April 2, 1998

Minutes of meeting between CanTox and Dr. Bertell/Mr. Dixon IICPH June 1, 1998

CanTox Response to IICPH July 21, 1998

Response of Regional Public Health July 30, 1998

ICCPH Response to CanTox Letter to CLC August 26, 1998

IICPH response to CanTox Response August 29, 1998

"An Urgent Need for Real Communication, A report on community liaison for the Taro East Landfill" Colin Isaacs with Susan FitzRandolph and Heide Ciplin July 1999

CanTox Community Health Assessment Review Based on 1997 Monitoring Report- June 30, 1999; Section A Taro 1998 Annual Report

CanTox Community Health Assessment Review Based on 1998 Monitoring Report- June 20, 2000; Section Taro 1999 Annual Report

Community Liaison Committee for the Taro East Landfill May 15, 2000 Memo To The "Expert Panel" Re Taro East Landfill

Dr. Rosalie Bertell, IICPH handout to panel July 4, 2000: Health Monitoring at Stoney Creek

Appendix H

Reference List

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Elliott, S.J., S.M. Taylor, S.D. Walter, D. Stieb, J. Frank and J. Eyles. 1993. Modelling Psychosocial Effects of Exposure to Solid Waste Facilities. *Soc Sci Med* 37(6):791-804.

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Habbick, B.F., M.M. Pizzichini, B. Taylor, D. Rennie, and M. Sears. 1999. Prevalence of asthma, rhinitis and eczema among children in 2 Canadian Cities: the International Study of Asthma and Allergies in Childhood. *CMAJ* 160(13):1824-8.

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Neutra, R., J. Lipscomb, K. Satin and D. Shusterman. 1991. Hypotheses to Explain the Higher Symptom Rates Observed around Hazardous Waste Sites. *Environmental Health Perspectives* 94:31-8.

Panaro, L. 1996. Brock West Landfill Site, Public Health Assessment.

Schwartz, S. and Chance, G.W. Children First. Ottawa: CICH. 1999.

Shusterman, D. 1992. Critical Review: The Health Effects of Environmental Odor Pollution. *Archives of Environmental Health* 47(1):76-87.

Shusterman, D., J. Lipscomb, R. Neutra and K. Satin. 1991. Symptom Prevalence and Odor-Worry Interaction Near Hazardous Waste Sites. *Environmental Health Perspectives* 94:25-30.

Tucker, P. 2000. Report of the Expert Panel Workshop on the Psychological Responses to Hazardous Substances.

Vrijheid, M. 2000. Health Effects of Residence Near Hazardous Waste Landfill Sites: A Review of Epidemiologic Literature. *Environmental Health Perspectives* 108(S1):101-12.

Wakefield, S. and S.J. Elliott. 2000. Environmental Risk Perception and Well-being: Effects of the Landfill Siting Process in Two Southern Ontario Communities. *Soc Sci Med* 50:1139-54.

Appendix II

Written Submissions Received by the Expert Panel

Preamble:

The Community Liaison Committee (CLC) was established as part of the Certificate of Approval for the Taro East Landfill.

The mandate of the CLC is defined by the Certificate of Approval for the Taro East landfill. The Terms of Reference of the CLC incorporated this mandate. Thus, the CLC is given the direction to:

1. Review and provide recommendations on annual operating and monitoring reports;
2. Review and provide recommendations on complaints and complaint handling procedures; and
3. Review and provide recommendations on any matters of concern to the community.

During the years, while progressing toward achieving its mandate, the CLC encountered many administrative, procedural and operational challenges. This will be later discussed within this commentary. However, the CLC has indeed provided a forum in which the public, PSC/Taro, Ministry of Environment, and other stakeholders, could participate in an attempt to mitigate the outstanding issues that were not addressed during the Environmental Assessment.

There is a consensus amongst the community, that had Public Hearings been conducted, many of the contentious issues surrounding the Taro East Landfill could have been resolved or answered. Thus, there is merit in the opinion that the CLC meetings have been an informal public hearing process.

Overall, the CLC has had success in identifying the issues relative to the landfilling of wastes in Ontario. The challenges of the future will be to work toward finding modes of resolution to the issues.

Acknowledgements

The CLC recognized the apology made to the citizens of Stoney Creek by the Honourable Minister Tony Clement. In addition, the CLC recognizes the commitment of the Ministry of Environment with the implementation of the Six Point Action Plan regarding the landfilling of wastes in Stoney Creek and throughout Ontario.

As part of the Six Point Action Plan, the Ministry established an independent expert panel "...to examine the potential for any long-term effects as a result of waste deposited at the Taro East landfill." In response, the CLC expresses gratitude toward Minister Clement, and the members of the Expert Panel, for their efforts to resolve the community crisis in Stoney Creek.

The CLC also recognizes the progress made by the Government of Ontario toward improving the handling of wastes in Ontario and the "harmonization" of legislation to match or exceed the environmental laws of the United States.

The government's introduction of legislation such as the amendment of Ontario Regulation 347 to clarify the "mixing rule", and the pending laws such as the "generator rule" and the "de-listing protocols", will accelerate Ontario in protecting the environment. The CLC is also aware that there is proposed Regulation to utilize the Toxicity Characteristic Leaching Procedure (TCLP) in substitute for the current Leachate Extraction Procedure. The CLC is encouraged and confident with the direction taken by the Government of Ontario.

The CLC also would like to thank MPP Brad Clark for his continued support of his constituents and on the issue of handling wastes (both hazardous and non-hazardous) in Ontario. Mr. Clark's due diligence in seeking resolution to landfilling of wastes in Stoney Creek, and throughout Ontario, truly makes him a respected Member of the Provincial Legislative Assembly.

Six Point Action Plan

The Terms of Reference for the Expert Panel submitted by the CLC was not implemented. As a result, the Terms of Reference established by the Hamilton District Office of the Ministry of Environment, which is significantly different from the CLC's submission, prevented the ExpertPanel "...to examine the potential for any long-term effects as a result of waste deposted at the Taro East landfill."

Having said this, the Expert Panel's Final Report has detailed recommendations, which allows the CLC to continue within its mandate to review and monitor the operations of the Taro Landfills and continue to make recommendations to the Ministry, the municipality and PSC/Taro.

Political Interference

It is with dismay that the Panel made comments on the municipal sewage treatment plant and land use planning that, in theopinion of the Community Liaison Committee (CLC), was not within the mandate of the Panel.

Yet, at the request of the Regional Chair Terry Cooke, the Panel made reference to the leachate and its treatment at the Woodward Water Sewage Treatment Plant (WWSTP). The comments on the leachate treatment were made in error and will be commented on later in this analysis. However, the issue of political interference is most disturbing. Within Appendix "C" of the Reprt, the lack of disclosure that there was dialogue with the Regional Chair is improper. The fact that the Regional Chair had requested that the Expert Panel pursue the issue ofleachate and the WWSTP, beyond the mandate of the Panel, enhances the concerns ofthe CLC. Upon questioning this issue, the Panel indicated that the Minister of Environment approved discussion of this issue.

At the request of Stoney Creek Mayor Anne Bain, the Panel made reference to the proposed sports park adjacent to the Taro West Landfill. Upon questioning this issue, the Panel indicated that the Ministeof Environment approved discussion of this issue

However, when the CLC requested the panel to conduct physical sampling of the landfill, or conduct tests on waste stabilizing processes, the Panel refused to expand their mandate. It appears that the panel would **selectively expand their mandate** at the request of local politicians but not at the request of the CLC. It is the opinion of the CLC, these aspects amount to political interference into the panel.

Threats of Litigation

The CLC observed that when PSC/Taro met with the Expert Panel, their legal counsel accompanied them. This may or may not have been an intimidating factor to the Expert Panel. The CLC questions the involvement of company lawyers within the dialogue.

The CLC is aware that PSC/Taro has several litigation cases against the Ministry of Environment and its officers. The CLC is also aware of the past history of PSC/Taro in seeking legal action against citizens and elected officials. These threats of litigation poison the environment surrounding the CLC.

Perhaps one of the most significant aspects of serving as a citizen member of the CLC is having to live with and adjust one's duties in an atmosphere of intimidation and insecurity. We are poignantly aware, as is the community at large, of the significant propensity of PSC/Taro to initiate litigation against individuals or groups who in the past, either by actions or words, raised concerns regarding the Taro landfills.

CLC members feel that the relative restrained scope of the Panel's recommendations also reflected their own awareness of this past litigation history. Furthermore the hesitancy of the report to recognize the significance of this intimidation factor could prove its major shortcoming in its quest to "help rebuild public trust and confidence", in the "government's ability to protect the environment and public health."

Without some form of security, legal support or safety net, the CLC cannot be expected to fulfil its mandate to the community or the government as per the Certificate of Approval or by the recommendations of the Expert Panel that includes CLC participation and activity.

In conclusion, in order for the CLC to continue its mandate or implement the recommendations of the Expert Panel, the CLC requires legal counsel.

CLC Guidelines

The Expert Panel Final Report states "The CLC was set up (as required by the C of A for the East Landfill) without benefit of any guidelines or formal assistance from the MOE in establishing its composition, structure or procedures."

As mentioned earlier, the CLC has encountered many administrative, procedural and operational challenges. This is a direct result of no formal guidelines in the formation and procedure of a Community Liaison Committee. Although the CLC recognizes that all formal committees need to be unique to the site and operation of a particular activity, the requirements of general guidelines need to be established.

Thus, the CLC requests that the Ministry of Environment provide funds to the Taro East Landfill CLC, to undertake the task in developing Ontario CLC Guidelines. In completing this task, the CLC would consult with the public, current and past CLCs, MOE, municipalities, and industry.

Leachate Treatment

The Expert Panel reports that Publicly Owned Treatment Works (POTWs) adequately treated pollutants in landfill wastewater, and only a very small quantities of pollutant loads discharged by landfills to POTWs are further discharged to rivers, streams or estuaries. Although there are no national pre-treatment standards, many U.S. jurisdictions require leachate pre-treatment especially from sites where "treated" hazardous waste has been landfilled. In addition, the Expert Panel did not review how successful WWSTP removed toxins from the Taro West Landfill leachate.

The current municipal owned Woodward Avenue Water Sewage Treatment Plant cannot handle the magnitude of volume of sewage. The recommendation to "*hold back the leachate at the landfill during by-pass events*" at WWSTP is not acceptable. Although the municipality owns the facility, it is operated by the private sector and there are conflicting perspectives as to what constitutes a by-pass.

The Panel also recommends that a study be undertaken to examine whether the addition of Taro East landfill leachate to the Woodward WWTP would or would not have a negative impact with regard to treatment of conventional or specific organic and inorganic compounds. The CLC supports this recommendation with the understanding that consultants retained by the CLC directly participate in the Study.

Furthermore, the Panel's Report concludes that there is no "evidence to suggest that current Taro operations are having any off-site impacts on eco-system health." The CLC rejects this conclusion with respect to both human and eco-system health. The release of landfill leachate to a municipal sewage treatment plant – anywhere – constitutes material leaving the waste site and hence causing contamination. Again, the Expert Panel did not research the impact of this contamination.

Environmental Inspector

To date, since December 1997, the Taro East landfill has had three different Environmental Inspectors. It appears that this is a direct result that the MOE's places the Environmental Inspector on contractual employment. This creates a high "turn-over" of Inspectors at the site and also leads to inconsistency.

Initially the Environmental Inspector was retained from a third party. The CLC raised concerns that the Inspector was not an officer of the Ministry and not full-time. Thereafter, the Inspector became an employee directly with the Ministry and made full-time. Under the Certificate of Approval, the company is responsible for the costs of the Inspector.

Although the Inspector is full-time, there is a need to make the position contractual to a minimum of three years.

The issue of Environmental Inspector's at landfills is not unique to the Taro East Landfill. The CLC is aware of concerns in Sarnia with the hazardous waste landfill. Thus, where there are royalties (tipping fees) existing at a landfill, there needs to be incorporated a full-time Environmental Inspector.

Land-Use Planning

Again, the land-use planning for the Taro West and East Landfills was not within the mandate of the Expert Panel. Given that the Panel chose to proceed with this discussion, the CLC requires that it be directly involved between land-use planning and agreements between the company, the new City of Hamilton, and the Community Trust Fund.

The CLC has learned that the members of the Community Trust Fund are legally appointed by the company and do not necessarily represent the community. Thus, the CLC should have at least one member, selected by the CLC, to become a member of the Community Trust Fund or participate in any agreements.

Incomplete Consultation:

During the Environmental Assessment (EA) for the Taro East Landfill, in addition to SCRAP, other agencies such as the Niagara Escarpment Commission (NEC), the Hamilton Regional Conservation Authority (HRCA) and the City of Stoney Creek were opposed to the landfill. However, due to the high costs involved, these agencies were prevented in making formal Public Hearing requests.

It was noted that the Panel failed to consult with the NEC. In fact, the Panel also omitted to seek the opinion or comment of any national environmental agency that has no direct connection with the Taro Landfills.

The Panel does make reference to the Canadian Institute for Environmental Law and Policy (CIELAP). CIELAP authored a report entitled "Ontario: Open for Toxics", where the main message was to reveal that "Hazardous waste disposal becomes a growth industry in Ontario". Although, rather than report on the context CIELAP's report, the Panel simply mentions the parody of the report's title when compared to the Ontario Premier's announcement "Ontario: Open for Business".

During the seven months in which the review was completed, the Panel did not meet with either Michael Hilson or Toni Skarica. These two gentlemen were among the five individuals that first brought forward evidence that American hazardous waste was being landfilled in Stoney Creek.

Of most significance, it was observed that the Panel did not meet with the Investigations and Enforcement Branch Officer who investigated the landfilling of American hazardous waste at the Taro East Landfill.

Furthermore, within the Reference section of the Panel's Report, there is an omission of the documentation provided by Roger Dixon to Dr. Bell. The correspondence between Dixon and Bell was relative to the issue of landfill sampling.

Finally, the Expert Panel did not meet with former CLC member Kathy McLean or current CLC member Paul Kurelek. There input would have been valuable.

Public Input

At the December CLC meeting, Dr. Bell remarked that he had, to date, received very little comment on the Report from the public at large. This is unfortunate but understandable. One needs only to recall the outrage and utter disappointment expressed by the public at the Panel's Second Progress Report presentation. The report lectured the community for "dehumanizing", "demonizing", "sensationalising", "inaccurate unfair reporting" etc. and for building a "degree of acrimony, distrusts and anger which is quite staggering." The report continued with a paternalistic sermon on the history of and potential application of concepts from the Brundtland Commission Report.

Clearly, at that meeting a finger-pointing tone was set – a tone with which the community was already familiar. The Expert Panel lost their opportunity to establish community dialogue early in the process.

Final Conclusions and Additional Recommendations

1. Although this commentary critically identifies specific aspects of the Expert Panel and their Final Report, the CLC is supportive of all the recommendations of the Expert Panel (with the exception of the treatment of leachate by WWSTP).

2. The CLC requests to be directly involved, or via the retention of independent consultants by the CLC, in the review of Taro Landfill leachate treatment by WWSTP.

3. The CLC specifically identifies the need for Ministerial testing and approval of the EcoSafe system and other waste stabilizing processes as recommended by the Expert Panel. The CLC requests to be directly involved in this review either directly or via the retention of an independent consultant by the CLC.

4. The CLC strongly advocates the implementation of "phased capping". This issue was noticeably not addressed by the Expert Panel. The rationale for phased capping is to decrease the amount of leachate production and/or exposure of particulate matter and landfill gases by capping each cell of the Taro landfill after the cell has reached capacity.

5. The CLC requires legal counsel in order to continue its mandate as per the Certificate of Approval and to participate in the recommendations forwarded by the Expert Panel.

6. The CLC actively participate in agreements relative to land use planning of the lands, and adjacent lands, of the Taro Landfills.

7. The Environmental Inspector for the Taro Landfills is retained as an officer of the Ministry for a contractual period of a minimum of three years.

8. Funding be provided by the Ministry of Environment for the CLC to develop "Ontario CLC Guidelines" in order to develop effective committees throughout Ontario.

9. Separate from item 8, the Certificate of Approval for the Taro East Landfill be amended to provide the CLC with $15,000 for administration and $35,000 for the retention of a technical expert, health expert, facilitator, legal counsel, and consultants as determined by the CLC, and for the incorporation of CLC restructuring. These particular funds are to be submitted in full to the CLC by PSC/Taro at the start of each year. Unused portions of the funds will be returned to PSC/Taro and all expenditures to be financially audited.

10. The CLC receive all submissions to the Expert Panel's Final Report and any comments to these submissions made by the Expert Panel.

11. The CLC supports the submission made by fellow CLC member Paul Kurelek and is attached to this commentary.

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November 10, 2000

W. Ruland
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Dear Will:

I am concerned as a citizen and as a scientist living in this city about Conclusion 12 (Section 10) of your report, which states that leachate from both E and W Taro's quarries should be treated at the Woodward Ave. Sewage Treatment Plant.

The reasons for this concern are:

1) The Sewage Treatment Plant is not even capable of handling the sewage it is designed to remove from Hamilton's waste water, hence it should not be expected to handle additional large volumes of leachate, for which it was not designed.

Note table 3.1 from a report prepared for the Regional Municipality of Hamilton Wentworth by Connor Pacific Environmental in April 1999. (enclosed)

(i) The Woodward plant only removes 10% of the ammonium from the influent, whereas the plants from Dundas and Waterdown remove 97.8% and 93.6%, respectively. The latter two plants are not particularly efficient or outstanding.

(ii) The concentration of total solids in the effluent of the Woodward plant is 14 times higher than that of the Dundas plant and 10 times higher than that of the Waterdown plant.

(iii) The cBOD of the Woodward plant effluent is 9.2 times and 7.0 times that of the Dundas and Waterdown plants, respectively.

(iv) Even the total phosphorus concentration, which should be removed by a precipitation step known for many years, is about 2 fold higher in the Woodward plant effluent than in the other two.

2) The cBOD in the effluent from the Woodward STP has been increasing since 1995, as have the total and suspended solids (Figures 2,3,4, Regional Environmental Services data, quoted in "Privatising Water Treatment, The Hamilton Experience, by J. Anderson, Labour Studies McMaster University, Jan 1999). (enclosed)

3) Together with the students of our W.A.T.E.R. programme, we have measured the concentrations of ammonium, phosphate, total coliforms, E.coli, dissolved oxygen and toxicity in

the effluent of the Woodward Ave STP over 5 years. We have done a rigorous set of tests on the validity and reliability of our methods and published this in Au. et al. J of Environmental Management vol58:213-230 (2000). The level of ammonium in the effluent is very high, in the range 0.1 to 1mM, the dissolved oxygen level is usually below 6mg/l regardless of the temperature of the water (this is close to the level of 4mg/l, below which most fish cannot survive). The total coliform level is frequently more than 100 times the recreational limit in the fall and winter months, when there is no chlorination. When there is chlorination the chemical concentrations are not very different, but the bacterial counts are close to zero. I have actually seen two dead rats floating in the water coming out of the effluent pipe of the WASTP at a time when the bacterial count was zero, due to chlorination, so it is an illusion to think that the water is clean because of the disinfection by chlorine. In fact excessive use of chlorine with organically rich waste water could be dangerous because of the possibility of formation of chlorinated compounds, particularly some amines that could be carcinogenic.

When we add all this together with the fact that Sewage Treatment Plants were not designed to remove solutes from leachate, especially those that are metabolized slowly or not at all by the heavy aeration process of the plant, then I think there is ample reason for concern. It would seem from the data presented above, that the aerobic process of the plant is not oxidizing much of the ammonium or removing enough of the oxygen consuming organisms/chemicals (which it should do) to be relied on to remove reduced substances in the leachate, and not the inorganic salts (which it is not designed to do) either.

4) I am also concerned about the take that the press and City Hall has on your report. Your Conclusion 12 does not state that it is contingent on a satisfactory outcome to Recommendation 6 (page 40) of your report. This has been taken to mean that the city can go ahead and permit the leachate from both of the quarries to be poured down the sewer. I believe that it is necessary for the Panel to rectify this problem as you are the only ones with complete credibility to do so.

Yours truly

George Sorger

George J. Sorger
Professor of Biology

GJS/as

Taxpayers Coalition of Hamilton-Wentworth
Suite 236, 2-558 Upper Gage Avenue
Hamilton Ontario L8V 4J6

Comments on Final Report: "Taro East Landfill Expert Panel". October 2000.

This presentation is prepared for the benefit of the taxpayers and is in conjunction with comments and opinions expressed by Dr. George Sorger, Biology Professor from McMaster University in Hamilton, and contained in a letter dated November 10/ 2000 and presented to the panel.
It is a result from a meeting on the McMaster campus with most members of the Expert Panel.
We have concerns about the accuracy of the Final Report and accept the Panel's invitation to point out factual errors contained in the report and bring them to your attention.
Since the Panel was to *"advise the Minister"* and *"help to rebuild public trust and confidence"* (page 9) the Panel must make sure that the report is accurate and the Minister has **all** information.
Since the Expert Panel's Terms of Reference was limited to investigation of "existing documentation" and not to gather new scientific data, it provides only half a picture.
If the *"existing documentation"* was provided by the MOE, Taro or its consultants, we have reasons to be concerned. Past history shows that the MOE did not do the job well and Taro has a conflict of interest and could be affected by the final recommendations of the Panel.
We like to point out **five minor errors** and **three major flaws** in the Final Report.

1. MPP *Brad Clark was elected in a by-election* is in error. (page 4) **This is wrong.**
   He was elected in the last regular provincial election.
2. Footnote # 17 has no place in the Final Report of the Expert Panel. (page 10)
   It is an expressed political opinion and **has no place** in the Final Report.
3. *" The Panel's Terms of Reference.....did not empower the panel to gather new scientific data or conduct primary research".* **This makes no sense.** Later we read:
   *"The Panel was authorized to recommend additional scientific data gathering..."*Footnote # 13.
   "In theory, the Expert Panel could have chosen to operate in any fashion". (page 8)
4. *"The Panel has learned that Michigan regulations would have allowed Philip to dispose of the waste in a non-hazardous landfill within its borders if the company had successfully applied to have the waste delisted".* (Footnote # 25, page 13.) **This also makes no sense.**
5. *"Officials from the MOE advised the Panel that the ministry not agrees that sampling is not the appropriate means to monitor what is in the landfill"* (Footnote 38, page 20.) **Say again?**
6. The Panel has concluded that *"....it is far more important to know what is coming out of the landfill than what is in the landfill".* (Recommendation 9, page 74).
   "Leachate from the Taro East and West Landfills is generally comparable"
   "Leachate from the West Landfill has caused ground water contamination..." and that significant degradation of groundwater quality was caused by Taro landfill operations"
   (Recommendation11, page 74.)
   As Taro West was not well designed and engineered it is even a greater concern as leachate is flowing mostly untreated directly into the lake, **the source of our drinking water.**
   The Panel did not entirely ignore the West Landfill leachate,(page 16) but offered no solutions.
7. The panel did not investigate the Compliance Agreement signed by officials from the Company and the Region as it is not on the list of References, (pages 78-90)
   Unless this document is given consideration, the Panel's recommendations are meaningless.
8. Some recommendations are based on inaccurate statements, without double checking and ensuring that the source of information received was reliable and accountable.

We intend to focus on Taro West and Taro East leachate, not hazardous waste or health issues.

1. The Panel came to the conclusion that the cost to remove chloride from the East Landfill was high compared to the benefit that would be achieved.
Why was the Panel concerned about costs when it was not in the Terms of Reference?
2. The Panel suggests that about 20 % of the concentrated leachate required off-site disposal. This is incorrect. 80 % would be clean water while 20 % of the balance could be evaporated leaving a concentration of all chemicals removed. This could then be recycled.
Is it not better recycled or stored than in our drinking water?
3. The Panel was also concerned about nuisance impacts on the surrounding community.
If the Panel had researched the impact on the community it would have found that is not the case.
4. The Panel claims the City of Stoney Creek planners do not favour the pre-treatment plant. It quotes Steve Miazga from the Planning department. (personal communication)(page 38.)
Attempts to contact Mr. Miazga failed, as he does not work there anymore. Mr. Marini from the Planning Department informed me that Mr. Peter Dunn from the Region told him that this facility needed smoke stacks 20 metres high with significant pollution, noise and smoke problems.
Mr, Dunn informed me that his information came from Taro. We have come full circle.
When I contacted Zenon Environmental in Oakville (an international Company with leachate treatment plants over the world) I was told that this is not the case. The proposed treatment plant basically makes drinking water out of leachate. It reduces leachate by about 80 % by taking clean water out leaving 20 % RO concentrate to be further reduced by evaporation.
The chemicals can be stored, disposed off or recycled. No smoke stacks, no noise, only steam.
A pre-treatment plant would also provide an opportunity to recycle road salt, metals and other chemicals and study the possibility of providing every landfill with the same equipment.
The proposed RO system can treat 100.000 litres a day, and costs approx. $ 1.5 million Can.
Taro East produces some 100.000 litres each day. Taro discharges 120 tonnes of chloride each year and is being by-passed at the treatment plant and ends up in our drinking water.
Is it not better recycled or stored instead of putting it in our drinking water?
Taro West produces 1.081.000 litres of leachate each day that is also bypassed and because leachate from Taro East and Taro West are comparable we can assume that Taro West discharges ten times 120 or 1200 tonnes of chloride into the "receiving water." (see # 6, page 1.)
What will happen to the Panel's recommendations if Environment Canada declares sodium chloride "toxic" that it is presently considering?
The Panel missed the point that road salt has a potential toxic effect on the environment and may, or is likely to be re-classified as "toxic" under Section 64 of the CEPA, 1999.
Environment Canada is presently considering that decision.
Taro West leachate is not acceptable and the discharge into the WWTP should be stopped.
"The Panel recommends that the WWTP and the Company develop and implement a notification system under which the Company will hold back the leachate at the landfill during by-pass or upset events" (8.3.4.3.)
The Regional sanitary sewer system has presently four (4) C.S.O. tanks (and several more are planned) that fill up with storm water and raw sewage during times of overload. These tanks will have to be emptied and will receive priority over leachate. Unless the Company is willing (or able) to hold back leachate for at least a week (or more) during severe rain storms or rapid spring melting this suggestion means nothing unless the foregoing is presented and approved by Taro.
While most of the recommendation made by the Panel make sense there is much more homework to be done before the recommendations are accepted by the Minister.
Charles Eleveld, President.

Taro East

The leachate of Taro East "*has elevated concentrations of inorganic parameters including chloride, sodium, calcium and potassium.*(page 25)

"*Observed concentrations of chloride and sodium are considerably above predicted values*" (p, 27.)

" *The concentrations of both sodium and chloride* ***greatly exceed*** *the expected values and in the case of chloride exceed the anticipated values by more than an order of magnitude (i.e. by more than a factor of ten)* (page 27.)

" *It is the most critical contaminent with respect to meeting the MOE' s <Reasonable Use Policy> requirements at this site*".(page 27.)

" *It is evident that the leachate from Taro East does not meet the Hamilton By-law for chloride or sulphate concentration* (page 33.)

Concerns about CyanoKEM waste presently in the East Landfill, and other hazardous wastes that may also be in the landfill are also a major concern.

The Panel suggests that core sampling is **not** recommended, as **only** leachate sampling will prove if hazardous wastes are in the landfill. That is the reason why we should be concerned.

" *The only way to determine if an individual load was hazardous is to have sampled the load before it went into the landfill*". (8.1.1)

As it is unlikely that the MOE is going to inspect every individual load from now on, we will only find out much later (even hundreds of years later) that hazardous waste maybe poisoning our lakes and by extension, our most precious resource, our drinking water.

The Panel now proposes to add leachate from Taro East to the sanitary sewer that is not designed to filter out the chemicals even when it is **not on by-pass** and simply "open the gate".

Taro East leachate has elevated concentrations of chloride, sodium, calcium and potassium (page 25.) and now the Panel proposes to "open the gate" without setting parameters.

The Panel should be aware that the WWTP was not designed to treat leachate.

What will happen when " *From the moment of emplacement, some of the wastes (may) undergo a series of chemical , physical and/or biological changes. In a few instances, materials that do not test hazardous at one time may become hazardous later on.* (page 18.)

It is unfortunate that the Panel ignored the solution that was staring them in the face!

The Proposed Compliance Program for Taro Aggregates Ltd. for the West Quarry Landfill Site was the answer. This agreement was signed in 1993 by Taro President , D. R. Wilson and Taro general manager, J. E. Fisher and by several Regional Officials.

This agreement was signed with the understanding that a leachate treatment plant would be built.

It is unfortunate that the Panel missed this most important document as it is not on the References list (pages 78-80) It was a binding agreement that would have solved the problems of today.

Why, or how did the Panel miss this document when it was discussed with most members of the Panel at a meeting held at McMaster University in the office of Dr. George Sorger?

While the Agreement was not included in the Final Report the Panel did consider building a leachate pre-treatment plant and simply dropped the idea.

The Panel concluded that the Reverse Osmoses Process plant needed "*significantly more evaluation of RO would be required before it could be adopted as a technical solution for chloride removal from the leachate*". (page 36.)

It seems that the Panel was misled.

The Panel simply accepted what was said, instead of making sure that the information was correct.

It suggested that there were four reasons why the pre-treatment plant was not an option.

November 10, 2000

Dr. David V. J. Bell, Ph.D.
Director, York Centre for Applied Sustainability
York University
4700 Keele Street
Toronto, ON
M3J 1P3

Dear Dr. Bell:

We were pleased to receive the Final Report of the Expert Panel on October 25th, 2000. The comprehensive nature of the report attests to the level of effort and thoroughness with which it was prepared. We have reviewed the report and would like to offer the following errata and observations for your information:

- Page 3 – paragraph 2 – Philip Environmental *Inc.* took ownership of the operation in *1990*,
- Page 3 – paragraph 4 – second sentence should read "Taro Aggregates Ltd. commenced…" Philip Environmental Inc. did not own the property until 1990.
- Page 4 – paragraph 3 – Brad Clark won an election not a by-election.
- Page 5 – paragraph 3 – the footnote number 10 appears to be wrong.
- Page 7 – paragraph 5 – Philip Environmental Services should read Philip Services Corp.
- Page 20 – footnote 38 – the word not should read now.
- Page 28 – paragraph 2 – The recommendation includes the suggestion that arsenic be added to the list of parameters to be monitored in the leachate. This parameter is already on the list, however, as was reported to us earlier in the review, fluoride had not been monitored. This situation has now been rectified and seven results have been produced from periodic samples taken this year. Fluoride has been included on the list of monitored parameters going forward.
- Page 31 – paragraph 1 – The sentence reads "…the leachate is often overstrength…" In fact the leachate from the West Landfill is rarely overstrength as evidenced by the monitoring records.
- Page 37 – paragraph 3 – second sentence "Noting the qualification (b)elow"
- Page 37 – paragraph 5 – The recommendations of the Panel appear in bold in other areas of the report —it would be consistent to bold this recommendation as well.
- Page 38 – "The panel recommends…" should also be in bold.
- Page 39 – Under the heading 8.3.3.3.3 – The panel was provided with the Companies' position on this issue at the briefing held on October 25th, 2000.

- Page 43 – paragraph under heading 8.3.7.1 – The sentence "All surface water is collected together with the leachate, and taken to Brantford for treatment." is incorrect. The surface water collected in the east quarry floor along with the dewatering sump water is pumped to the west landfill sewer and is discharged to the sanitary system with the west landfill leachate.
- Page 52 – Last paragraph – "In fact roadwork…" This sentence is in error – It was test drilling for the development of the closure plan which led to the discovery of small amounts of methane gas at the southern boundary of the West Landfill in 1993. Immediate steps were taken to mitigate the situation without explosion or evacuation as has been erroneously reported in the media.
- Page 58 – footnote 81, page 59 – footnote 83, page 79 – letter reference – Brads' last name should be spelled Farnand.
- Page 61 – the document referenced in footnote 92 has not been released yet. May we have a copy when it becomes available?
- Page 78 - CBC – the reference date is 1999.
- Page 103 – footnote 10 – the date of the memo should read September 21, 1999.

If you have any questions or require any clarification of the above information, please contact me at your convenience. We look forward to reviewing the report contents and recommendations with the Ministry of the Environment in the near future.

On behalf of my staff, and myself I wish to thank you and the members of the Panel for your hard work and balanced approach to this challenging review.

Yours truly,

Derek McClurg
General Manager
Taro East Landfill

SUBMISSION TO BE INCLUDED IN THE FINAL REPORT TO THE MINISTER BY THE EXPERT PANEL

Submitted by Paul Kurelek, November 15, 2000.

If one were to summarize the sentiment felt in the community around the Taro/Philip waste site, it would be of helplessness, hopelessness, powerlessness. Taro was receiving special government consideration and was rumbling through the community like some omnipotent monster. The MOE was showing no capability, and worse, no inclination, to follow up on public concerns.

In short, they came to feel that they were being sacrificed. Sacrificed by a political system that placed economic considerations above a balance with social and health concerns.

What avenue was left to the community aside from desperation and anger? No one listened or reacted to their concerns – they were left to fend for themselves and did so. One event after another, one outburst after another, led to the government being forced to recognize and initiate the Expert Panel to legitimate, to investigate and to perhaps ease their fears.

Even though early in the study the Panel recognized that the number one priority was sampling the dump, it failed to follow up on the significance of this, missing a golden opportunity to resurrect peace of mind and confidence in the community. Given the total lack of trust in Taro/Philip on the subject of what might be in the dump, the community is no wiser or more satisfied than it was prior to the Panel's work. There may be small improvements if some of the recommendations made in the Report were to be implemented. But based on past experience, this is unlikely to happen.

The following comments are an attempt to encourage serious debate and stronger positions by members of the Expert Panel, and perhaps make those who are in a position to respond to the Panel's Report more appreciative of the implications to the people living near the Taro waste sites.

<u>Comments on Conclusions of the Expert Panel's Report</u>

Conclusion #1

From a narrow, technical perspective, Taro may not have violated Ontario laws re: CyanoKEM waste, but the fact that Taro took advantage of relatively weaker Ontario regulations was déja vu for the community. The Report shows no appreciation of the traumatic significance on the community of such activity and attitude (one of many examples). In short, the Report implies Taro did not break the law so thus there is no reason for residents to be upset or alarmed and entirely no reason to make themselves ill with worry. This conclusion will not help the community: They still have to live with a company in which they have no trust.

Conclusion #2

This conclusion is ambiguous, misleading, inconclusive, and simply not acceptable. It states that there is no evidence "that significant or widespread dumping of hazardous waste has occurred". But what is "significant"? What is "widespread"? The suggestion is that there was no dumping of hazardous waste. But the Report leaves the reader wondering whether the Panel looked hard enough to find the

evidence.

What the community wanted to know was if there was at all any hazardous waste in the site. What degree of precision can one attach to "significant" or "widespread"? How precise is "little if any"?

It is astounding that the Panel can Report that small quantities have occasionally slipped in with bulk shipments or that the Ecosafe process may not have fully stabilized all of the hazardous material in the mixture. But what tonnage in a pile of several million constitutes "not significant" or "not widespread" or "little if any"? Is this terminology scientific? Does such a description of potential hazardous waste in the landfill give us a clearer picture of what is there than would core sampling or bulk sampling? The community will look at this Conclusion #2 as nothing more than side-stepping of the demand for actual sampling.

The reason the Panel chose not to recommend sampling is the subject of a later point.

Ultimately, such statements suggest that nobody, not the Expert Panel, certainly not the community, knows how much hazardous material is in the dump.

Conclusion #3

The Panel rightly expressed concerns about the technique used in the Ecosafe process. But the gingerly nature of the Panel's stand – i.e. "have some concerns" – is counterproductive and does not recognize the importance of this potential avenue of bringing hazardous waste into the dump. Certainly the community would be much more assured with a stronger statement. And as the Panel knows, or will soon find out, even strongly worded statements are easily ignored by politicians or bureaucrats who do not have to live around the dump.

Conclusion #4

This Conclusion is particularly troublesome for several reasons. People residing in close proximity to the dump have no more assurance that the contents of the dump are or are likely to be inconsequential than they were a year ago. What they read will leave them with this: They and the Panel do not know if the Ecosafe products in the dump are stabilized or not. They and the Panel do not know if the unstabilized quantities are minute or massive. They and the Panel do not know if "hot spots" are mobile or immobile. No one knows if and when such problems will occur, or the nature of the leachate that will be produced. No one knows the nature of new compounds and chemicals that may appear in the leachate. The community has legitimate concerns about who will handle and accept and pay for potentially great volumes of hazardous leachate. How will the mysterious chemicals affect containment materials and technology?

Conclusion #4 does not adequately stress the total unacceptability of <u>any</u> amount of hazardous waste entering a nonhazardous site by any means. It suggests we should resign ourselves to accept hazardous waste (some? how much??). Clearly, this conclusion leaves more questions than answers.

Conclusion #5

Obviously any real (we must be wary of 'perceived') changes to Ontario's hazardous waste Regulations are welcome.

Conclusion #6

The Panel, by accepting "the current landfill monitoring paradigm" indicates community voices were unheeded. Past and current screening of incoming wastes are fully inadequate according to local citizens – it is of considerable importance to their security and peace of mind. Time and again the Panel has been made aware that current frequency of monitoring entering and leaving the landfill is cause of considerable unease and apprehension. This is aggravated by the overwhelming aura of distrust with Taro/Philip. It would seem logical to recommend significant increases in monitoring for important information gathering as well as to reduce community anxiety.

Conclusion #7

This Conclusion represents the greatest failure of the Expert Panel Report. Early on, it was acknowledged that what most traumatized the community was that they didn't know what was going into the landfill. As a result of their treatment at the feet of Taro/Philip, politicians and bureaucrats (M.O.E), the community felt abandoned. They felt like a community sacrificed to economic, bureaucratic, and political expediency. Their only hope (and hope was all they had left) was that they could regain some degree of peace and dignity and empowerment by knowing what had been and was presently going on at the dump.

Having this information would put them back on an equal footing, would establish some respectability with Taro/Philip, the bureaucrats, politicians, etc. Very simply, they needed to know. Early on in the process, the Panel did seem to understand the importance of this. But, if Conclusion #7 is to be taken seriously, the finished Report leaves the community exactly where they had been all along: A community with little hope to regain their self-respect. The Panel could have (should have) recommended, plain and simple, that sampling be done – then the community would have felt a great sense of relief and satisfaction – that would have been a good starting point. Protocols, standards, guidelines, would have been established much more quickly than they will be by feeble "recommendations" that M.O.E. "study the advisability and feasibility". No one with any exposure in this issue holds their breath for the M.O.E. or politicians to act on such weak recommendations.

Why is it so easy to conclude that in the absence of precedence the sampling would be of no value? Why can't the argument be made that this is a technique that the industry and public protection branches of our government should master, and master quickly? It's as though we haven't yet acknowledged the value of a safe environment. We all, citizens, industry, government, and scientists, will have nothing to lose but plenty to learn. Sure, Taro/Philip will scream they are being unfairly treated compared to other dumps. Fine. The Panel could have argued that it truly is a special situation, for many reasons. It has a distinctly urban location and its precarious geologic setting is special, its new technological design is untested, etc. The Panel's recommendation could have been very significant towards breaking new ground. Instead, the Panel played conservative and cautious and missed its primary opportunity to take a bold step. To add what appears to be insult to insecurity, the Panel reminds the community that because of "exemption for small quantities" and because

nonhazardous "may test hazardous later on", the door is wide open. Theoretically, a large truck load of hazardous waste could be dumped and spread in the waste site and the presence of waste could be noted in a sample but not definitely attributed to illegal dumping. It sounds like open season. In fact, by this logic, the more tonnage in the waste site, the more hazardous waste can be diluted.

Conclusion #8

Naturally, any recommendation to the M.O.E., or any regulatory body, to improve waste handling safety is welcome. Unfortunately, these, like other stands taken by the Panel in their Report, will be looked at by the community as far too timid and falling short of the potential of improving the quality of life around the dump.

Conclusion #9

This point attempts to reinforce the Panel's recommendation that no sampling be done. Essentially it tells us that what we don't know won't hurt us. Any scientific assessment of risk necessitates consideration of potential as well as the existing situation. The M.O.E.'s six-point plan, which mandated the Panel's study, clearly states that "potential for long term effects"is to be studied. It's so ironic that so much attention lately has been given to the suggestion that individual and community health should give greater emphasis to anticipation and prevention of illness in addition to ultimate cost of treatment. The Panel's Report is very weak on recommending increased monitoring. Conclusion #9 suggests that if we refine corrective medical care, then there is no need to expend energies on prevention or studying potential problems.

Conclusion #10

So much – too much – hinges on the Panel's fixation with "state of the art". It can be equally argued that collecting and depositing wastes (in this case acknowledged hazardous waste) in a liner of any sort is anything but "state of the art". Surely state of the art waste management is management and reduction at source and discouraging primitive, risky, and unproven dump containment technology. There is no justification for the complacency which the Panel's Report exudes and the accompanying reluctance to involve itself in sampling. One would have hoped that the Panel would acknowledge the frequent fallibility of "state of the art" technology, particularly when health is involved. Reducing effects of potential containment failure should be addressed by major tightening of monitoring and control of incoming and outgoing materials – something the Report lacks.

Conclusion #11

There are a number of aspects of the heavy reliance on leachate analysis and sampling that must be of concern and probably in need of further study. When and how, for example, will all chemical activity and potential chemical activity in the relatively young waste site actually show in leachate analysis? Do present samples represent all areas of the dump? What amount of uncertainty and unpredictability is to be expected, given the vagaries of rainfall and inconsistencies of incoming waste, etc. The community would probably benefit from further study on the validity of heavy reliance on leachate sampling and analysis interpretation.

Conclusion #12

This conclusion makes a mockery of the concept of "state of the art". There is nothing state of the art about waste site management that encourages and depends on returning incoming wastes to the ecosystem. A connection, whether it be a pipeline or tanker truck, that is entrenched by legal documents or contracts, represents major potential environmental and health risks. Legal documents and pipe connections respond very poorly to fluctuations in leachate analysis. And, as we have seen vividly lately, they do not respond at all to information showing the inability of treatment plants to actually treat leachate.

The resulting breakdown of public security and confidence in environmental and health management appears to be of little concern in Conclusion #12. The breach of public trust caused by the evaporation of Taro's promised treatment plant also was not recognized by the Report. As far as the community is concerned, it will be business as usual and leachate will continue to flow to treatment plants.

Conclusion #13

This conclusion only serves to emphasize how bizarre Conclusion #12 was to encourage leachate diversion to municipal treatment plants. How does the Panel Report envision compatibility between concern for public health and waste leachate going to the Woodward Treatment Plant, while at the same time, recognizing that treatment plants do not fully treat or are subject to bypass? A state of the art" East Quarry dump contaminates our environment as capably as a primitive West Quarry dump. The community was hoping for a change of direction.

Conclusion #14

There should be no surprises about the uncertainty of contaminated West Quarry groundwater behaviour, nor the conflicting management theories proposed. The West Quarry ground water contamination patterns are behaving as unpredictably as a fractured limestone bedrock hydrology should. The degree of effect from pumping degraded groundwater on hydrology of the entire East and West Quarry region is unknown. To the community, it's only a matter of time until the East Quarry makes its contribution. The Report should have made an effort to ease this concern by making bold and significant recommendations to increase monitoring of incoming and outgoing materials.

Conclusion #15

This Conclusion calls for the same concerns and criticisms as those raised by numbers 12 and 13. Collected surface water from both East and West Quarries are likely contaminated to varying degrees by the wastes brought in. Similarly, this material should not be tolerated or accepted by municipal treatment plants, which, for the most part, are not designed to treat adequately. Once again, the Panel could have made the case that landfills – in particular one claiming leading edge technology – not allow contaminants to leave the site.

Conclusion #16, #17, #18

These Conclusions can be considered together as being a concern over material leaving the site. To date, the frequency of monitoring and documenting dust and gaseous emissions has been inadequate. Odours come and pass frequently and quickly, as do bursts or dust, and no doubt volatiles of various

kinds. Such short term exposures have been virtually impossible up to now to pinpoint, identify, and verify. But it's crucial to appreciate that such short term exposures, particularly over long periods, can cause significant effects to humans and the environment. Considerably ~~increasing the frequency~~ of all monitoring is the only way to understand waste site effects. Such information would play a major role in health studies and diagnoses. The importance of accumulating frequent short term data cannot be over-emphasized.

Conclusion #19
A one-time health study would certainly be welcome and timely. But in keeping with the great potential for short term exposures to certain types of air-borne escapees, some extra provision should be made. For example, an individual experiencing a temporary bout of illness could very easily have been affected by materials escaping from a particular lot of waste dumped and spread. Such temporary illness should not be taken lightly. Some provision should be made, and made known to the community whereby a designated health facility can be made accessible on short notice to deal with such events. This type of short term adverse exposure can perhaps be corroborated with monitoring equipment readings, if such data is available regularly and frequently.

Conclusion #20
Some procedures should be recommended by the Panel for periodic soil and perhaps tissue sampling in the perimeter of the waste site. Such information could be a valuable supplement to, and corroboration for, other mechanical collecting and monitoring devices. It would be valuable – perhaps crucial – to establish basic guidelines for soil and plant tissue analysis, as references for future work.

Conclusion #22
The proposed sports park is out of the question. It is particularly risky during the years when wastes are being deposited and moved around. This risk will increase dramatically as the height and size of the filling area increases. Why is the Panel passing judgement on a planning issue? It suggests there may have been other influences requiring this area to be studied. If the Panel is prepared to state that the existing Heritage Green Community Sports Park provides assurance that a new park could be constructed, then they should also be prepared to present much more data as back-up information. Its existence alone is hardly evidence that all was and is 'OK'. Such a leap of logic is very unexpected in this Report.

Conclusion #24
It would be wise to recommend, as mentioned earlier, that substantial increases be made in frequency and quality of monitoring. Only by this extra effort will the confidence and normalcy of day-to-day living creep back into the community. Local people have suffered an exceptionally poisoned environment in their relations with operators of the dump.

Conclusion #25
The CLC has functioned admirably, under circumstances in which the waste site owner, Taro/Philip, has consistently attempted to control the public agenda. Friction was the only alternative to capitulation and complete isolation from the community. Nowhere was there a better example of

Taro's divide-and-conquer approach than in the complete isolation of the East Quarry Study Group. Any modification to the present format for the CLC should recognize Taro's past performance in dealing with such vital liaison groups.

Conclusion #26
The description in the Report of the behaviour of Taro/Philip in their relationship with community is basically accurate. "Aggressive" behaviour is an understatement. The public perception is that the company will stop at almost nothing to run their operation without any consideration for community or environment. And that the operation as it exists today is a reflection of strong pressure from the community, rather than voluntary initiatives on the part of the company. The community continues to believe that ultimately aggression must be met with kind.

Conclusion #27
Of all the tragedies played out in the East Quarry saga, the greatest will have been the complete collapse of the M.O.E. and its stature in the community. People couldn't disagree more with the Panel's statement that the M.O.E. is "well able to protect public health and the environment". The public had enormous expectations that the Expert Panel would shake up the M.O.E. and government policy simultaneously. There was nothing else they could hope for. They were on their own. Their protector, the M.O.E., either didn't care or had been hijacked to serve private business. People were looking for the Expert Panel to leap beyond the M.O.E., but at present no one is holding their breath.

Summary

A strong sense of hesitancy, of holding back, permeates the Report. Why not break new ground in sampling of the wastes? Nothing would have been more therapeutic to the community, ultimately to settle the issue once and for all. It would have forced people to fully understand what they had to believe or not believe.

A perplexed and frustrated community will have to accept that:
1) Uncovering significant hazardous wastes would have major negative impacts on politicians at many levels of government.
2) The finding of hazardous wastes would cause tremendous embarrassment and criticism of the M.O.E.
3) Finding hazardous waste would likely spin off to months or years more involvement for the Panel members. This would not have been welcomed by everyone, as evident in comments made by Dr. Bell.
4) Complications, including liability, finger-pointing, including potential litigation from many angles, could almost be considered inevitable.
5) Clean-up, which would probably have been required, is not something any party was anxious to initiate.

A strong sense of pessimism hangs over the Report – a sense that little or nothing positive for the community will occur. It will likely perpetuate the feeling of powerlessness and uncertainty that the community hoped would end.